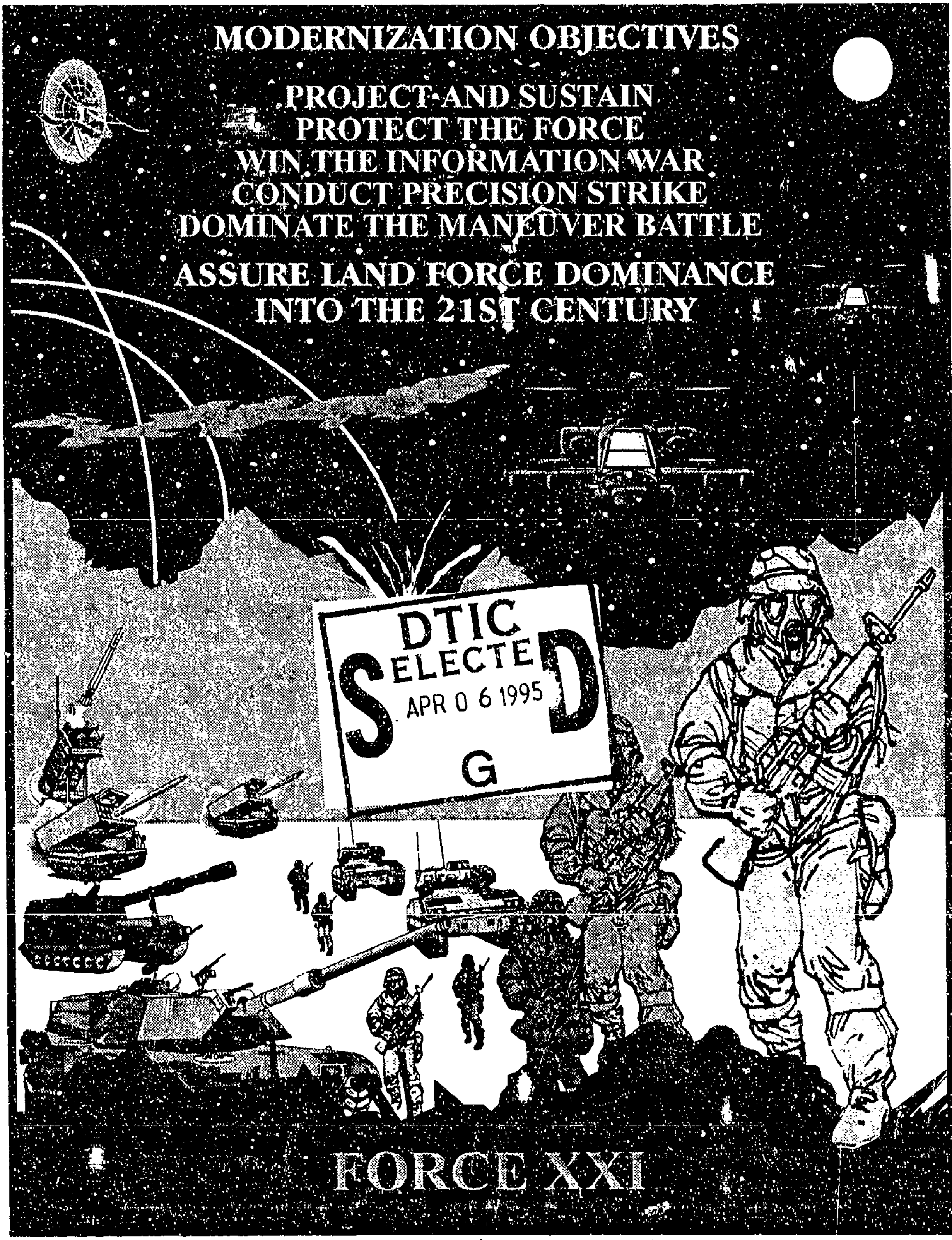
UNITED STATES ARMY MODERNIZATION PLAN



DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

SUBJECT: Army Modernization

The Army's fundamental charter is to win the nation's wars and protect its vital interests around the world. America expects nothing less from us, and **LAND FORCE DOMINANCE** underpins this contract. Our nation dominates warfare today as few other nations in history have, but we must continue to improve if we are to maintain this position of strength and meet the challenges of the 21st Century. Consequently, our vision demands that America's Army is, *"trained and ready, serving the nation at home and abroad, a strategic force, capable of decisive victory...into the 21st Century."*

We have charted a course to realize this vision and modernization plays a central role in that plan. The Army Modernization Plan explains in detail what we must accomplish and our strategy to get there. Our future force will need to operate fluidly and easily as part of any joint or multinational effort. As other nations strive to match our capabilities, the Army will have to become more lethal, survivable, deployable, and sustainable to retain its competitive edge. Further, it will have to control the tempo of any future operation. It must be versatile enough to execute any mission we assign it across the range of Army operations. Finally, it must be able to transform itself continually as the world situation, doctrine, and technology dictate. We call this objective force, "Force XXI."

To create Force XXI, we must focus our research, development, and acquisition resources on developing the capabilities cited above. Our five modernization objectives provide that focus and the framework for our RDA investment strategy. Achieving these five modernization objectives--Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate Maneuver--will give us a more versatile and capable force capable of dominating military operations across the range of missions our government expects us to execute.

Our vision is clear. Our path to future **LAND FORCE DOMINANCE** is direct. **FORCE XXI** will be the result...capable of winning our nation's wars and protecting its national interests....decisively.

Gordon R. Sullivan
General, United States Army
Chief of Staff

Togo D. West, Jr.
Secretary of the Army

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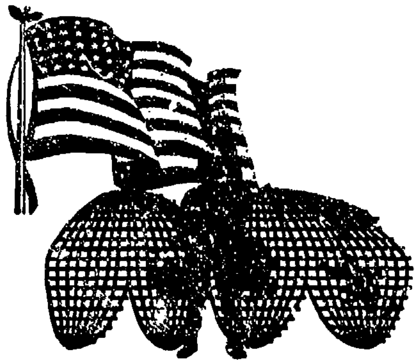


"When our vital interests are challenged, or the will and conscience of the international community is defied, we will act - with peaceful diplomacy whenever possible, with force when necessary."

President William J. Clinton

TODAY'S STRATEGIC ENVIRONMENT - UNCERTAIN AND UNSTABLE

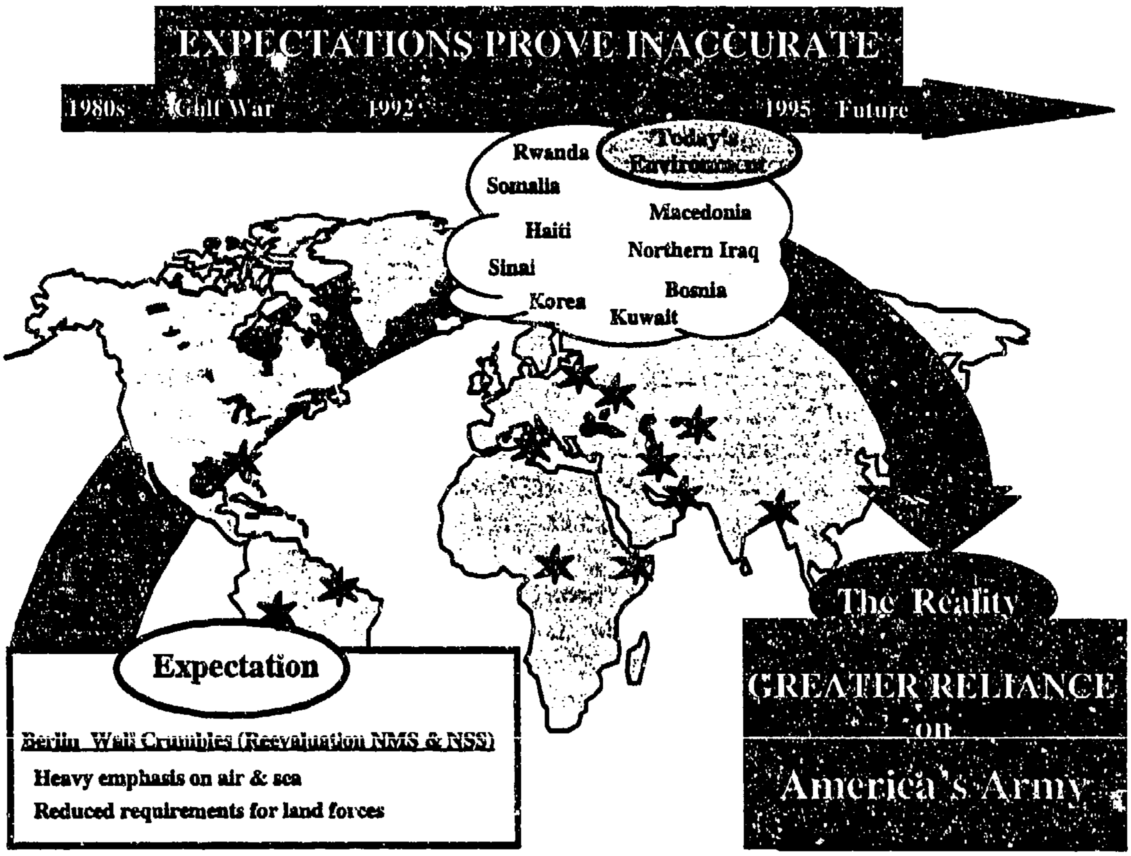
Today's strategic environment offers both danger and opportunity. The current threats are diverse and multipolar. They include: regional instability caused by ethnic, religious, historical and economic disputes, potential failure of reform in the former Soviet States, proliferation of weapons of mass destruction, and transnational dangers such as global terrorist groups, drug traffickers, and crime syndicates. The Nation also faces a changing and uncertain economic landscape as former communist states develop market economies and national economies convert to global economies. This uncertain/unstable environment prompted a reevaluation of the National Security Strategy and the National Military Strategy. The National Military Strategy is FLEXIBLE ENGAGEMENT. The Army is engaged worldwide on a continual basis to support the two strategic military security objectives--*promoting stability and thwarting aggression.*

America's Army promotes global stability through regional cooperation and constructive interaction. In support of this strategic objective, the Army participates in conflict prevention through a variety of activities that include military-to-military contacts, humanitarian and nation assistance, disaster relief, and the establishment of an interested overseas presence.

Thwarting aggression requires the Army to be capable of deterring attacks, including those involving nuclear, biological and chemical weapons, against the United States, its forces, its allies and friends. Should deterrence fail, the Army as part of a joint or multinational force must be capable of defeating any potential enemy, swiftly with minimum casualties. To accomplish this mission, the Army must maintain Land Force Dominance through overmatching capabilities.

EXPECTATIONS PROVE INACCURATE

At the end of the Cold War, the U.S. reviewed its military force structure. The Bottom Up Review (BUR) designed a force with emphasis on air and sea forces in anticipation of fewer land force requirements. Critical force enhancements were factored in as part of a composite capability to defeat any threat. The force enhancements that allowed force structure cuts included: improving strategic mobility through air and sealift, strike capability of aircraft carriers, lethality of Army firepower, and delivery of smart munitions by long-range bombers. However, the post Cold War expectation of fewer land force requirements has proven inaccurate. As a result, the Army has been challenged to meet increased troop deployments and maintain high operational readiness with a rapidly decreasing force structure and a radically declining budget. The tempo of current operations remains high. Since 1989, the Army has experienced a 300 percent increase in operational deployments.

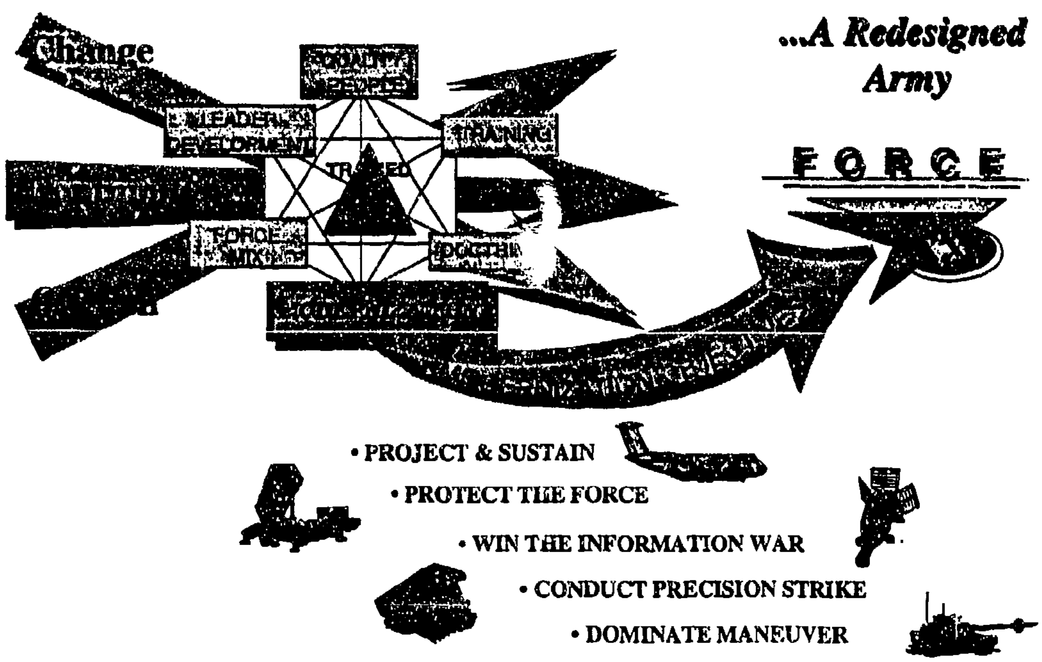


Military Ops Supporting Flexible Engagement - Peacekeeping, Peace-Enforcement, Humanitarian Assistance, Domestic Support, Disaster Relief, Noncombatant Evacuation Ops

> *"Our political leaders may respond to crisis in ways which demand from us capabilities which we never previously anticipated. Our leaders expect maximum flexibility--They expect us to succeed at whatever task they assign. We will be judged by only one criterion: Did we win?"*
>
> GEN Gordon R. Sullivan
> Chief of Staff, Army

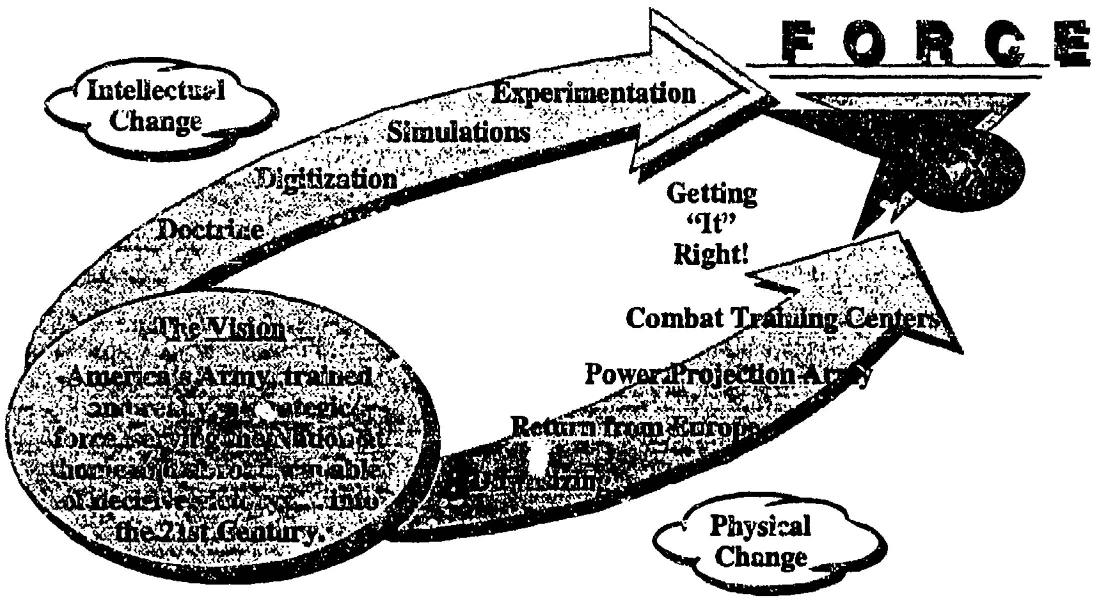
ADAPTING TO THE NEW WORLD: THE ARMY VISION

Given the strategic environment and the U.S. National Military Strategy, the Army is adapting to meet the Nation's security needs today and in the future. The Army must redesign itself to meet the challenges of the changing environment, and, at the same time, remain trained and ready to defeat today's adversary. Force XXI is a redesigned force for the 21st Century. Transitioning to that force means the Army must balance change, continuity and growth in six imperative areas: People, Training, Leader Development, Force Mix, Doctrine, and Modernization. The modernization imperative is key to achieving Force XXI. The modernization objectives--Project and Sustain the Force, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle--provide direction and focus for the balanced insertion of all technology (most importantly--information technology) into the force. This modernization approach enables the Army to gain the maximum synergistic effect from future technology investments. This Army Modernization Plan (AMP) provides information regarding specific systems which contribute to the achievement of the modernization objectives.



THE ROAD TO FORCE XXI

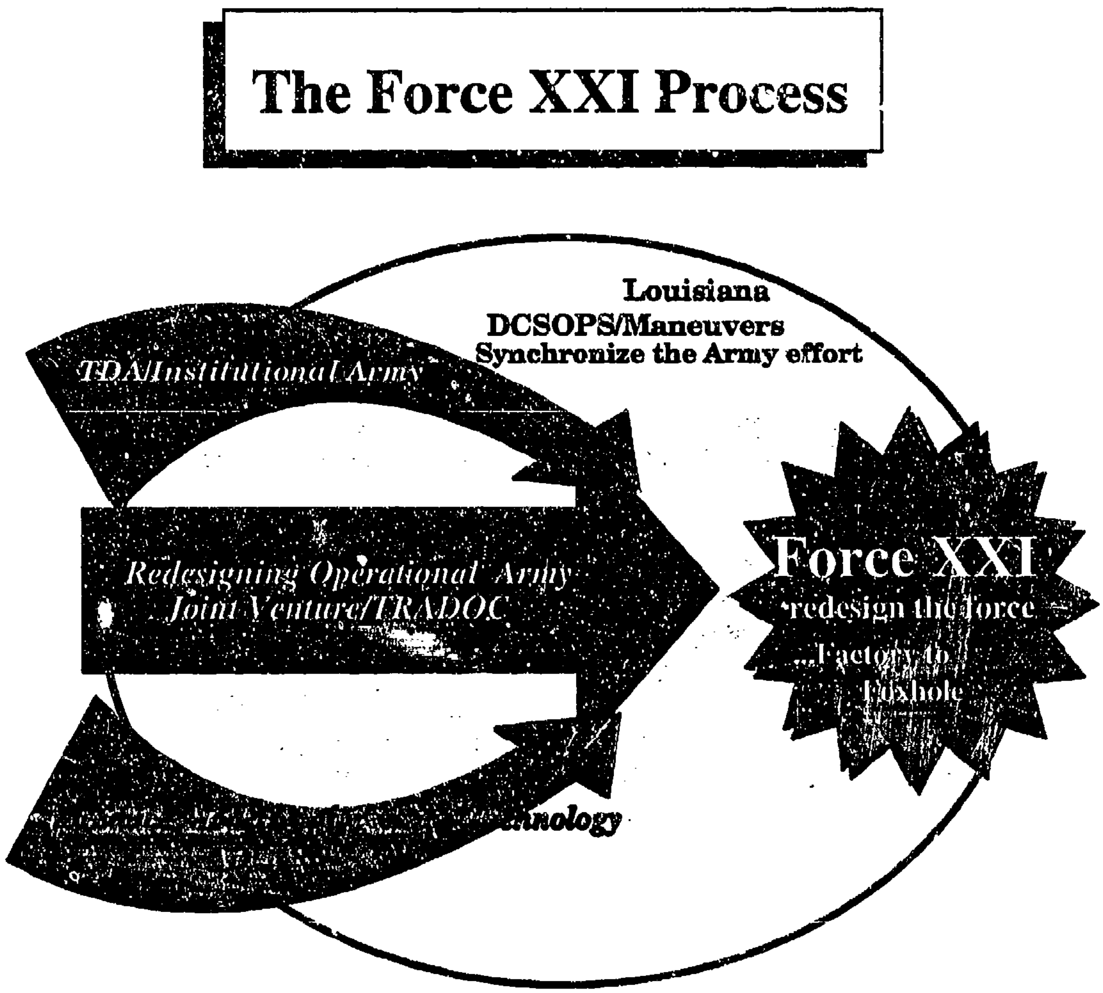
Transformation begins with intellectual change. Such change is derived from multiple sources. Within the joint, multinational, and interagency environments, joint doctrinal publications, such as *JP 0-2, Unified Action Armed Forces (UNAAF)*, and *JP 3-0, Doctrine for Joint Operations*, provide the fundamental precepts upon which to develop Service, plus subordinate joint, concepts and doctrine, tactics, techniques, and procedures. Army concepts and doctrine are derived from joint precepts and procedures as well as the systematic evaluations of national security documents, threats, exercises, and actual operations.



The combination of vision and appreciation of systematic evaluations manifest the development of future concepts that projects future military operations and the capabilities needed to succeed in those operations. The Army's vision of future military operations in war and in Military Operations Other Than War (MOOTW) is expressed in *TRADOC Pamphlet 525-5*, **Force XXI Operations. A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century**. This document focuses the development of concepts, programs, experiments, and initiatives, to be used Army-wide, as we transition to the future. It represents a continuation of change initiated by the 1993 version of *Field Manual 100-5, Operations*. The TRADOC pamphlet is also the foundation for the development of Force XXI--an Army capable of commanding and controlling joint and multinational operations using forces that are versatile, deployable, lethal, survivable, and sustainable. Such forces enable commanders to control the tempo of operations, and thus assure success across the entire range of military operations.

THE FORCE XXI PROCESS

Force XXI is a vision that will provide focus for the modernization of the force. The Force XXI Campaign Plan describes the process by which the Army will attain the Force XXI vision. The Campaign Plan consists of three axes. The main axis, called Joint Venture, will address the operational force. The two supporting efforts are called the TDA/Institutional Army and the Army Digitization Office (ADO) axes, respectively.



The Joint Venture axis, under the leadership of TRADOC, will redesign the operational force. A division-size experimental force (EXFOR) has been designated which will conduct a series of iterative and interactive Advanced Warfighting Experiments (AWEs). The initial component of the EXFOR will be a redesigned, digitized brigade sized task force, called Task Force XXI. Task Force XXI, with a division command and control element, will conduct an AWE in early 1997. The goal of these experiments is to develop force design changes that improve lethality, survivability and allow commanders to control increased operational tempo. The results of this effort will provide a basis to make informed decisions regarding refinements in the areas of doctrine, organizational structures, training and leader development. In addition, insights gained from these experiments will aid decisions about research, development and acquisition of future technology.

While Joint Venture proceeds, a second axis, the TDA/Institutional Army axis, will redesign the TDA Army. This effort began Phase I in the fall of 1994 and is scheduled to be completed in the year 2000. The mission is to field a TDA Army, during the period Fiscal Year (FY) 02-07, that will meet the Title 10 needs of the Force XXI Army. Therefore, the redesign effort must be done in harmony with the Joint Venture Campaign Plan (and vice versa). The Charter and Campaign Plan assign key players and identify objectives, management structure, methodology, and desired outcomes for each area. Additionally, the charter and campaign plan assign HQDA sponsors and MACOM proponents for each Title 10 functional area and assessment responsibilities during the redesign. This axis will be synchronized with the Joint Venture and the ADO axes.

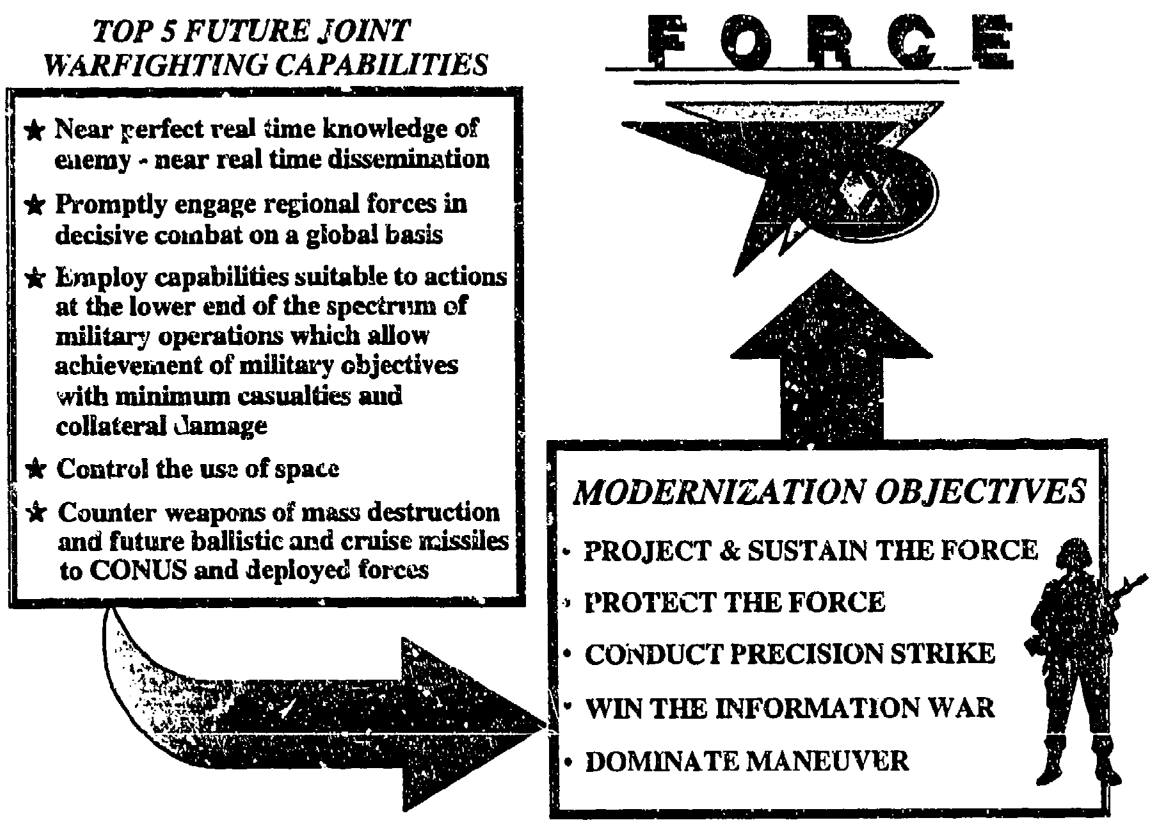
The third axis, the responsibility of the ADO, provides programmatic support for acquisition and assimilation of information age Command, Control, Communications, Computers and Intelligence (C4I) capabilities into the force. The ADO oversees and coordinates the integration of Army battlefield digitization activities, and ensures the information age technology necessary for Force XXI is fielded horizontally across the force. The careful coordination of information technology insertion preserves a trained and ready Army as we transition to Force XXI.

The Deputy Chief of Staff for Operations and Plans (DCSOPS) with the Louisiana Maneuvers Task Force (LAM) will synchronize the work of the three axes and provide the means for senior Army leaders to focus on critical intellectual growth issues and make policy decisions. Specifically this process will articulate to decision-makers the intellectual basis for warfighting changes; force redesign; present hypotheses for testing through experiments, simulation, and modeling; and, guide the allocation of resources. The LAM process allows important decisions to be made in months rather than years.

EVOLVING TO FORCE XXI

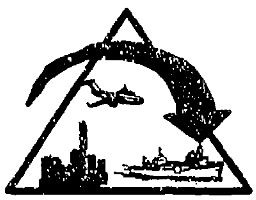
Force XXI must have joint, multinational and interagency connectivity. *TRADOC Pamphlet 525-5* postulates all future operations will be joint or multinational. As a result, joint, multinational and interagency operational requirements must be considered for every new system. For this reason, the Army's Five Modernization Objectives support the top five Future Joint Warfighting Capabilities discussed in Volume Four (Future Capabilities) of the Joint Planning Document.

In addition, the Army's modernization efforts and expenditures are focused on enhancements to current systems or new technologies that provide significant value-added improvements for the warfighter. The process undertaken to transition to Force XXI will be evolutionary.



The Army's five Modernization Objectives keep expenditures focused on the joint warfighter of the future. These objectives are: Project and Sustain the Force, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle. In addition, the modernization objectives provide a framework for the specific requirements defined in *TRADOC Pamphlet 525-66, Operational Capability Requirements* for Force XXI.

The Army's five Modernization Objectives are:



Project and Sustain the Force - The Army is a Continental U.S. (CONUS) based force. It must quickly deploy forces, and sustain them, whenever called upon. Thus, the Army requires capabilities for global, rapid force projection. The Army remains a staunch supporter of both the Air Force C-17 and the Navy Large, Medium Speed, Roll on/Roll off Lift Ship programs. For Army requirements today, and to support Force XXI, the Army has implemented, or is considering:

- Prioritizing its CONUS installations for power projection capabilities. These include: upgrades of rail and air heads and upgrades of information infrastructure to allow split-based operations;

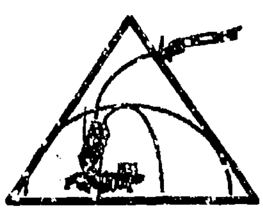
- Improving logistic support and reduction of wasted resources through information systems which provide in transit visibility, total asset inventory, and telemetry for anticipation of future requirements;

- Logistics operations which are deployable, expandable, split-based and include civil sector involvement;

- Prepositioning equipment afloat and on land;

- Developing equipment which is lightweight, durable, and multipurpose (for example, to lighten the soldier's load and to acquire light armor); and

- Adopting international commercial standards wherever possible to improve interoperability of systems and consumables.



Protect The Force - The proliferation of weapons of mass destruction, and the means to deliver these weapons, pose one of the greatest threats to ground forces, especially during early entry operations. The increasing missile threat brings with it corresponding nuclear, biological, and chemical (NBC) employment threats. In addition, protecting the force against fratricide requires accurate situational awareness.

The Force XXI objective capabilities in this area include:

- Theater missile defense;

- Air defense against unmanned aerial vehicles (UAVs) and remote piloted vehicles (RPVs) that target and report locations of friendly forces to the adversary;

- Measures to prevent fratricide, via development and acquisition of improved precision navigation, combat identification systems, improved identification friend or foe (IFF), and munitions insensitive to sympathetic detonation;

- Improved NBC protection, including combat vehicle contamination avoidance detectors, soldier protective suits with support systems, and collective NBC crew protection;

- Extended range and enhanced precision for intelligence systems allowing more time to synchronize battlefield actions; and

- Medical survivability, to include telemedicine and the development of preventive vaccines for biological/chemical agents.

Win the Information War - Information will be the most powerful weapon in the next century. Targeting and incapacitating the information systems of adversaries, while protecting our own, will allow deep and simultaneous attacks and lead to overmatching force and decisive victory. Rapidly advancing technology provides new opportunities for efficiently executing command and control responsibilities. At the same time, potential adversaries also have access to advanced technology to enhance their own command and control. To Win the Information War, Force XXI must have:

- Real time intelligence on moving targets and the capability to disseminate relevant information to the appropriate level of command;

- Electromagnetic spectrum supremacy;

- Access to national intelligence sources at all levels of command, tactical through strategic, and interoperability with joint and multinational intelligence organizations;

- Space-based systems which provide surveillance, communications, weather data, environmental contamination data, terrain and mapping data; and positioning and targeting data;

- Wide-band terrestrial communications systems providing the means to pass increased quantities of data;

- Systems with electronic warfare protection features;

- Systems that deny space-based information systems to the adversary;

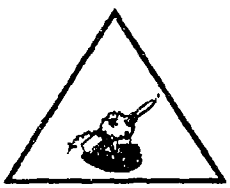
- Enhanced electronic warfare capabilities;

- Horizontal/vertical seamless communication architectures which provide voice, data, graphics, imagery, and video information to all battlefield operating systems;

- Joint, multinational, and interagency interoperability;

- Information security, and

- Systems that provide the relevant common picture to commanders at all levels.



Conduct Precision Strike - Seizing and controlling land continues to be the mission of the land component commander in the 21st Century. To assist in the accomplishme[illegible] mission, the land component commander m[illegible] an organic capability to conduct deep attacks against [illegible]eat. To successfully attack targets at extended ranges, the 21st Century commander must have capabilities to find designated high payoff targets and distribute information/intelligence in near real time to firing units. These units must have the ability to immediately destroy those targets under all conditions. The capability to execute rapid, successful deep precision strikes, provides the means to defeat the threat and Protect the Force. The capabilities provided to the land component commander in the 21st Century will be:

- A system that is highly responsive to the commander's immediate needs (reduced sensor to shooter time);

- The ability to control the operational tempo;

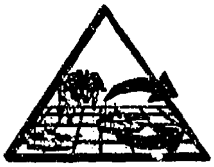
- The ability to seize and retain the initiative;

- The ability to dictate the terms of the close battle;

- The ability to limit the opponent's freedom of action;

- Effective day/night, all weather capability; and

- Force protection to minimize friendly casualties.



Dominate the Maneuver Battle - Rapid, decisive victory is the essence of Land Force Dominance. Future modifications to existing systems and the development and introduction of new platforms, can provide our forces overmatching capabilities to defeat any threat. Initiative, depth, agility, synchronization, and versatility continue to be the tenets of future Army ground combat. 21st Century maneuver forces will have:

- Increased range of lethal and nonlethal weapons;

- Better night and all weather fighting capabilities;

- Light armored packages;

- Command and Control (C2) on the move;

- Automated threat location data;

- Rapid force dispersion while massing fire; and

- Digital map displays of friendly forces and threat locations, routes, and mission planning.

Enabling Strategies

As the Army modernizes to meet future capability objectives, innovative strategies must be employed to manage scarce modernization resources. These enabling strategies are: Horizontal Technology Integration (HTI); joint warfighter focus for all research, development, and acquisition; the Army Enterprise Implementation Plan (EIP); and synthetic theater of war (STOW).

Horizontal Technology Integration - HTI modernizes by aggressive exploitation of leading-edge technologies across multiple systems to improve the warfighting capabilities of the Army. HTI breaks away from the traditional "vertical stovepipe" processes of individual system requirements. For example, when a new technology improves our ability to fight, it is simultaneously integrated and fielded into existing system upgrades, component upgrades, and new platform acquisitions. The result is interoperable warfighting capabilities across the force. The commonality among systems also pays dividends in reduced life cycle costs by enabling focused technology development, economies of scale in production, a simplified maintenance approach, and

concentration of critical operator and support skills. More information about this process, and the HTI systems being fielded or developed, is found in Annex D (Horizontal Technology Integration).

Joint Warfighter Focus For All Research, Development and Acquisition. The Army is designing the Army of the next century, Force XXI, with insights gained through extensive AWEs and Battle Laboratory Warfighting Experiments (BLWEs). The LAM TF and TRADOC are leading this effort, referred to as Joint Venture. Industry and Army laboratories advanced concepts, technology, and prototypes are being evaluated by live, constructive, and virtual simulations. This integrated warfighter, industry, and acquisition community team, not only ensures focus on the warfighter, but it also improves quality and speeds technology transition. All Advanced Concept Technology Demonstrations (ACTDs), Advanced Technology Demonstrations (ATDs), and Advanced Concepts and Technology II (ACT II) programs are sponsored by a TRADOC Battle Laboratory. ACTDs must also be sponsored by a warfighting CINC. The JCS has identified its top five Joint Warfighting Capabilities needed, and OSD, supported by the Services and JCS, published the first Defense Science and Technology Master Plan providing implementing guidance to the Army and valuable information for industry consistent with the Defense Strategy, JCS Joint Warfighting Priorities, the Army Modernization Plan (AMP), and the warfighters' requirements for Force XXI.

Army Enterprise Implementation Plan (EIP) - The EIP, a natural follow-on document to *The Army Enterprise Strategy--The Vision*, provides assessments of existing Command, Control, Communications, Computers and Intelligence (C4I) systems, a migration plan blueprint to help shape our C4I investment strategy, and details nine specific actions to reshape Army information and communications systems (see Annex F). For the purpose of the Enterprise Implementation Plan (EIP), C4I modernization refers to those command, control, communications, computers, and intelligence systems that meet, or are being developed to meet, valid functional information and communications requirements for both Command and Control (C2) and Combat Service Support (CSS). The Enterprise Implementation Plan addresses these requirements from both sustaining base and tactical perspectives. The EIP presents the Army C4I community a disciplined process consistent with the AMP. The EIP also implements the Horizontal Technology Integration initiative, and directly supports the efforts of the ADO. The established Enterprise Strategy Control Structure will use this Plan as its point of departure to shape Force XXI. The Implementation Plan is a "living document," and will be updated periodically.

Synthetic Theater of War (STOW). Today, the Army verifies concepts, systems, and equipment through extensive use of modeling and simulation. In the future, a Distributed Interactive Simulation (DIS) capability will allow the creation of a synthetic theater of war. An interface capability will be embedded in every critical combat system, training simulator, and communications system.

This internetted system of simulators will permit users to better assess warfighting concepts, doctrine, force structures, logistics, and weapons systems of friendly, neutral or opposing forces. Because the system is distributed, many users will have simultaneous access; and can conceptualize, experiment, test, evaluate, train, or rehearse in a synthetic theater of war. Concepts and fundamentals of ground combat and joint warfare that impel force design, unit organization, and materiel requirements will be modeled/simulated prior to investment. The Army modeling and simulation goal is to facilitate compressed system acquisition time, enhance training and testing and, at the same time, conserve resources.

Army Equipping Policy (Force Packaging)

The Army's desired end-state is to have a highly ready (C1), fully modernized, deployable force. The interim goal is to equip Army units to prescribed readiness levels commensurate with their warfighting requirements. The intent is to maintain the highest level of readiness (C1/C2) in selected forces by providing them more modernized resources at higher levels of fill, while maintaining minimum acceptable levels for the Total Army. The requirements of the U.S. National Military Strategy, tempered by considerations of affordability and risk, determine the basis of the size and composition of America's Army. Once such determinations are made, the Army is further organized into strategic Force Packages (FP); these are defined by "first to fight" priorities. Currently, Force Package 1 consists of certain Special Operations Forces and Rapidly Deployable Forces, including required supporting psychological operations (PSYOP), civil affairs, echelons above division and echelons above corps units. The Army's Forward Presence/Force Deployed units are found in Force Package 2. Force Package 3 consists of Initial Reinforcing Forces and certain Special Operations Units. Force Package 4 is composed of Follow-on/Reinforcing Forces.

The force packaging methodology establishes priorities for issuing equipment in conjunction with the Army's tiered resourcing philosophy. The highest priority FP is normally resourced first. The Department of the Army Master Priority List (DAMPL) details this method of resourcing the Total Army. The Total Army (Active Component, National Guard and Reserve) units receive new equipment in accordance with their designated Force Package. Force modernization policy uses the DAMPL as the baseline document for determining distribution priorities, and provides the following principles to guide consideration for beyond DAMPL distribution: priority to "first to fight"; maximize lethality and survivability; field all weather/all condition fighting capability; design for future modernization; modernize by FP; optimize readiness and training; and, pure fleet (vehicle standardization, by type) for sustainability.

In addition, the Army practices "cascading." Cascading is the logical redistribution of fielded materiel displaced by Total Package Fielding of new materiel. The goal is to optimize Total Force readiness levels by ensuring critical fielded items displaced by fielding of new items are redistributed to units based on relative "first to fight" priority and future new item fielding. This is accomplished by centralized control (at HQDA) of the items of equipment which have Total Force readiness and force modernization impact. Redistribution is used to fill shortages or replace older equipment in order of DAMPL priority.

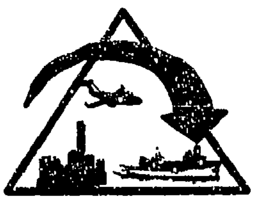
SUMMARY

During the past five years, the Army has reassessed its role within the framework of the changing strategic environment and a changed National Military Strategy. The Army has adapted to meet new challenges in a new and dynamic environment. The Army continues to improve doctrine, training, leader development, organizations, materiel, and systems for soldiers. These efforts will increase the effectiveness of the force.

The Force XXI Army will have a significantly improved capability to command and control joint and multinational operations with forces that are versatile, deployable, lethal, survivable, and sustainable. With such forces, commanders will control the operational tempo across the range of military operations. Every effort undertaken by the Army is focused toward meeting our obligation of service to the Nation during war and peace.

MODERNIZATION ASSESSMENT

In a resource constrained environment, the Army's modernization objectives provide focus to balance force capabilities for Force XXI and core programs. Balanced technology insertion to achieve the modernization objectives is a key part of the Army's plan to reach Force XXI. At the same time, the modernization objectives ensure core programs (trucks, generators, utility/cargo helicopters, and ammunition) retain proper priority to meet required resourcing goals. This modernization appraisal provides a subjective assessment--RED, AMBER, GREEN--of each modernization objective. This rating is based on the anticipated required 21st Century capabilities (listed on pages 8-11) and the current status of core programs necessary to meet resourcing goals. Each modernization objective is rated in the near-term (1995-96), mid-term (1997-00), and far-term (2001-09). RED means no capability exists, or is insufficient to defeat the threat or provide the required support. AMBER means a limited capability or quantity exists to achieve the modernization objective. GREEN means adequate capability and quantity exists to achieve the modernization objective.



Project and Sustain the Force - Past operations relied heavily on forward deployed forces for rapid and effective response. Today's environment and future environments demand the capabilities to project CONUS-based forces quickly, and to sustain those forces for extended periods of time. Army strategic mobility improvements include prepositioned War Reserves, CONUS infrastructure improvements, and continued support for both the Air Force C-17 and the Navy Large, Medium Speed, Roll on/Roll off Lift Ship (LMSR) programs.

Force structure reductions and the return of theater reserve stocks to the Army have enabled prepositioning of equipment to improve our responsiveness to contingencies. An afloat set of equipment for a combat brigade and its supporting units is on station. The Army is the executive agent for all common-user land transportation and water terminal operations in theaters of operation; four ships with supplies and port opening equipment are ready to respond. By 1997, the Army will have 12 prepositioned ships with combat unit equipment, plus units capable of executing port and terminal operations, ground movement, and Logistics-over-the-Shore (LOTS) operations. These ships make the Army capable of responding to crises or conflicts anywhere in the world.

CONUS installation infrastructure improvements include upgrading rail lines, access roads, and loading facilities, plus additional railcars and containers. CONUS installations designated as power projection bases will also receive upgrades to their information infrastructure, allowing them to conduct split-based operations. The improved information infrastructure permits implementation of

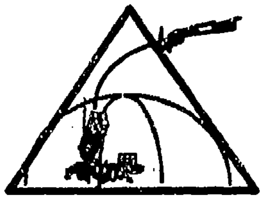
increased Logistics-over-the-Shore (LOTS) capabilities, Total Asset Visibility (TAV) and In Transit Visibility (ITV) to increase logistics efficiency, and the Total Distribution Program (TDP) to manage the distribution from factory to foxhole. However, any failure to procure programmed satellite systems will adversely affect the Army's capability to conduct split-based operations and, as a result, Force XXI logistics operations.

The Army has core programs such as tactical wheel vehicles and utility/cargo helicopters, essential to Project and Sustain the Force. The production of Palletized Loading Systems (PLS) has helped the heavy truck fleet. The light and medium fleets, however, have been hampered by procurement reductions and production stoppages. The age of utility and cargo helicopters will become a sustainment problem in the far-term (when the CH-47 helicopter airframes will be more than 40 years old, and UH-1s will still be in the fleet because insufficient funds prevent buying adequate numbers of UH-60s).

The tactical electric power program provides tactical generators for command post, intelligence, communications, and logistics functions. Current funding for these programs is inadequate. The average age for the mid-term of these systems is 18 years.

Conventional ammunition has significant shortfalls. Training ammunition is not fully funded for FY 97-01. Industrial-based, stockpile management, and demilitarization functions are resourced to address critical requirements only. For ammunition modernization, there are 17 modern war reserve ammunition items (excluding SADARM and Bunker Defeating Munition (BDM)). The Army will only procure 8 of these 17 munitions. Modernization of ammunition is not supported at current funding levels. In addition, only 76% of the ammunition production base is funded.

Project and Sustain the Force is rated AMBER for the near-, mid-, and far-terms. Improved airlift and sealift capabilities are still required. Strategic lift improvements will significantly enhance the Army's ability to Project and Sustain the Force in the near- and mid-terms. However, the degraded medium and heavy helicopter lift capability, the lack of funding for medium and light tactical wheel vehicles and tactical generators, and, in addition, the status of ammunition modernization keeps this objective area rated AMBER into the far-term.



Protect The Force - Military forces are most vulnerable during initial, forced entry into hostile areas. During the early stages of such operations, the systems required to protect forces are limited in availability. The specter of attack at this time by theater missile, nuclear, biological, or chemical weapons is ominous. Moreover, the potential for fratricide still exists during any military operation.

Early entry/forced entry forces require far better protection from weapons of mass destruction. The fielding of PATRIOT Advanced Capability 3 (PAC-3) and Theater High Altitude Area Defense (THAAD), assisted by early warning alert from Joint Tactical Ground Stations (JTAGS) provides Force XXI the capability to respond to the growing theater and cruise missile threat. However, short range missiles remain a significant threat to the maneuver forces. Capabilities to defend against fixed wing manned aircraft exist, but the stand-off Rotary Wing Anti-Tank Guided Missile (ATGM) still poses a lethal threat to maneuver forces. Improvements to the Stinger missile and onboard launch capability from the Bradley Stinger Fighting Vehicle Enhanced (BSFV-E) are required to counter this threat. Missile defense against the very short range theater ballistic missiles (VSRTBMs), cruise missiles, UAVs and RPVs that target locations of friendly forces is sufficiently improved only when Corps SAM is fielded.

Fratricide reduction is enhanced most by accurate situational awareness. Measures to prevent fratricide such as: improved precision location and navigation, combat identification systems, and improved IFF contribute to better situational awareness. These capabilities are enabled by advances in information technologies. The Army is actively focusing the use of such technologies to digitize the battlefield and implement the Enterprise Strategy to reduce fratricide.

Survivability enhancements through the POM period include development of a biological detection capability, an NBC stand-off detection capability, and a multiagent chemical detection capability. Shortfalls in the area of individual and integrated collective protection are expected to be overcome by the far-term with the fielding of new capabilities beginning in the mid-term. Technology is the limiting factor in the area of decontamination. A technology solution that will achieve waterless decontamination is required. Technology to develop and procure a receptor targeted immunization for biological agents will be a far-term goal.

Combat casualty care for soldiers has some shortfalls in advanced medical diagnostic communications. This is further aggravated by the far-term inadequacy of the aeromedevac fleet. The POM terminates UH-60 production after FY 96, 800 aircraft short of requirements. Further, the current MEDEVAC fleet must remain a composite force of UH-60s and UH-1Vs due to shortage of modernization funds.

Protect the Force is rated AMBER for the near-, mid-, and far-terms. This rating is a consequence of the lack of an effective combat identification system and low rates of fielding detection and survival capabilities. Although continuous improvements are taking place in this important modernization objective area, the shortfalls in protection of the maneuver forces against cruise and short range

ballistic missiles, and the far-term lack of aeromedevac capability keep the rating AMBER through the mid- and far-terms.

Win the Information War - Information warfare capabilities harness the advances in information technologies in order to collect, process, disseminate, and use information. The AMP goal is to provide Force XXI the capability to destroy, disrupt, and exploit an adversary's information systems while ensuring our warfighters' ability to receive accurate, actionable intelligence/information.

The Army is fielding a robust sensor capability for Force Package 1 units and some Force Package 2 units. UAVs will enable commanders at brigade level and above to control their fight by providing targeting, force protection, and situation development. Additional airborne capabilities, including Advanced Quick Fix, the Guardrail Common Sensor, and Airborne Recon Low (ARL), provide real time Signals Intelligence (SIGINT), Imagery Intelligence (IMINT), moving target information, and electronic attack capabilities to assure electromagnetic spectrum supremacy. Other capabilities include the Joint Surveillance Target Attack Radar System (JSTARS) target acquisition through the Common Ground Station (CGS), the Ground Based Common Sensor (GBCS), Ground Based Sensor (GBS), air surveillance and tracking for Forward Area Air Defense System Command, Control and Intelligence (FAADSC2I). Shortfalls in the track mounted GBCS for mounted forces adversely effect their on-the-move collection capability.

Access to national intelligence sources is maintained through continuous improvements to the Army Tactical Exploitation of National Capabilities (TENCAP) program which provides intelligence from national to tactical levels. The All Source Analysis System (ASAS) fuses information from multiple systems. The information is then distributed through a communications architecture that will continue to improve with digitization and the implementation of the Enterprise Strategy.

Extensive use of space-based systems contributes to Winning the Information War. Communications capability for split-based operations is provided through military, civil, and commercial satellite sources, in many cases direct to Army satellite terminals and ground stations. Space systems also provide surveillance capability from national assets; up-to-date weather and environmental effects information through the Integrated Meteorological System terminals; terrain and mapping data for use in systems like the Aviation Mission Planning System (AMPS); and precise position location using small Global Positioning System (GPS) receivers. GPS capabilities are also being integrated into several Army platforms.

Information capabilities are also enhanced by terrestrial capabilities of systems such as the Army Data Distribution System (ADDS), which passes increased quantities of data. The fielding of Have Quick/Radios and the improved Data Modem will provide target handover and digital message capability for Army aviation.

Advanced technology allows incorporation of electronic protection warfare features. For example, the Secure, Mobile, Anti-jam, Reliable, Tactical (SMART-T) multi-channel satellite terminal for Military Strategic Tactical Relay (MILSTAR) satellites will provide range extension capabilities for Mobile Subscriber Equipment (MSE). It also incorporates Low Probability of Intercept (LPI) and Low Probability of Detection (LPD) features. C2 protection and defensive capabilities are critical to assure the security of information capabilities of the warfighter. SCAMP is a Single Channel Anti-jam, Manportable MILSTAR terminal that will be employed at corps and below tactical units. SCAMP provides required voice and data range extension for command and control. More resources are required to support these requirements.

Information security systems (INFOSEC) assure multilevel security from CONUS to the operational theater and within the operational theater. Current funding levels for these programs are limited.

Denying the use of space-based information systems is a critical capability envisioned for the 21st Century warfighter. Capabilities in this area are limited, but must be developed consistent with national policy.

Win the Information War is rated AMBER for the near-, mid-, and far-terms. Horizontal/vertical seamless communication architectures which provide voice, data, graphics, imagery, and video information for all battlefield operating systems are not yet fielded for the warfighter. The efforts to digitize the battlefield and implement the Enterprise Strategy will take advantage of the rapid changes in technology to move toward a seamless architecture in an efficient and affordable manner. The objective remains AMBER through the far-term based on inadequate funding to procure the appropriate quantity of systems to meet Force Package 2, 3, and 4 requirements.

<u>Conduct Precision Strike</u> - Seizing and controlling land will be the mission of Force XXI. To assist in the accomplishment of this mission, the Force XXI commander must have an organic capability to conduct deep attacks against the threat. To successfully attack targets with precision at extended ranges requires the capability to see deep then transmit that information/intelligence in near real time to firing units employing advanced weapons and munitions systems.

To enable the Force XXI Army to see deep, a family of capable sensors is being fielded. UAVs designed for close, short, and extended ranges will provide the warfighter with unprecedented real time situational awareness. The capabilities of UAVs in concert with airborne sensor platforms such as Joint Surveillance and Target Attack Radar System (JSTARS) and Guardrail Common Sensor (GRCS), and the armed reconnaissance Comanche helicopter, as well as, national assets downlinked through TENCAP and fused by the All Source Analysis System (ASAS) and the Advanced Field Artillery Tactical Data System (AFATDS) will provide the warfighter with the information needed to attack deep targets quickly and efficiently.

Precision Strike munition improvements in the mid- and far-terms will enable Force XXI to effectively take advantage of sensor and targeting architecture advances to deliver deep fires with unequaled precision. The longer range Global Positioning System (GPS) guided ATACMS Block IA will be fielded in Fiscal Year 1998, to be followed in Fiscal Year 2001 by ATACMS Block II carrying the Brilliant Anti-Armor (BAT) submunitions. The extended range ATACMS Block IIA carrying the P3I BAT will be fielded in Fiscal Year 2003.

Conduct Precision Strike is rated AMBER through the mid-term but will improve to GREEN in the far-term. The improvement is due to the fielding of sensors and information/intelligence distribution systems (ASAS and AFATDS), and munition modernization (ATACMS, Block IA and II) occurring in the mid- and far-terms.

Dominate the Maneuver Battle - Today's Army as well as Force XXI must be able to control and dominate the fight in order to achieve swift, decisive victory with minimum casualties. Modernization of the maneuver forces aims toward making them more deployable, tailorable, and lethal. Maneuver forces must be able to get to the area of operations, and once there, they must have the versatility to function in both war and Operations Other Than War (OOTW).

Maneuver force improvements in range and lethality are achieved with the fielding of Javelin and Improved Target Acquisition System (ITAS) in the mid-term. Far-term fielding of ATAS and LOSAT could provide more improvements. ATAS and LOSAT are funded through the Advanced Technology Demonstration (ATD) phase, only.

The range extension of fire support for mounted forces is limited to Paladin and extended range MLRS rocket improvements. AFAS and FARV are far-term programs.

Mounted force (M1 Abrams and M2/3 Bradley) improvements continue in the near- and mid-terms through digitization programs and Second Generation Forward Looking Infrared (FLIR) technologies.

Mounted force command and control will be enhanced by the C2V, but fielding will be in small numbers. The current maneuver control system, as a component of the Army Battle Command System (ABCS), will be fielded to additional forces, but will still be short of requirements. The Improved Data Modem for aviation will enhance situational awareness and flexibility. GPS integration into platforms will enhance all maneuver force capabilities.

There is a modernization gap between maneuver weapons systems and counter obstacle capabilities. There will be improvement with the fielding of the M1 Breacher, the Heavy Assault Bridge (HAB), and the Airborne Stand-off Minefield Detection System (ASTAMIDS) but the numbers are too limited to adequately support mounted force maneuvers. Countermobility improves with the fielding of Volcano and Wide Area Munition (WAM), but WAM numbers are again insufficient for even the contingency forces.

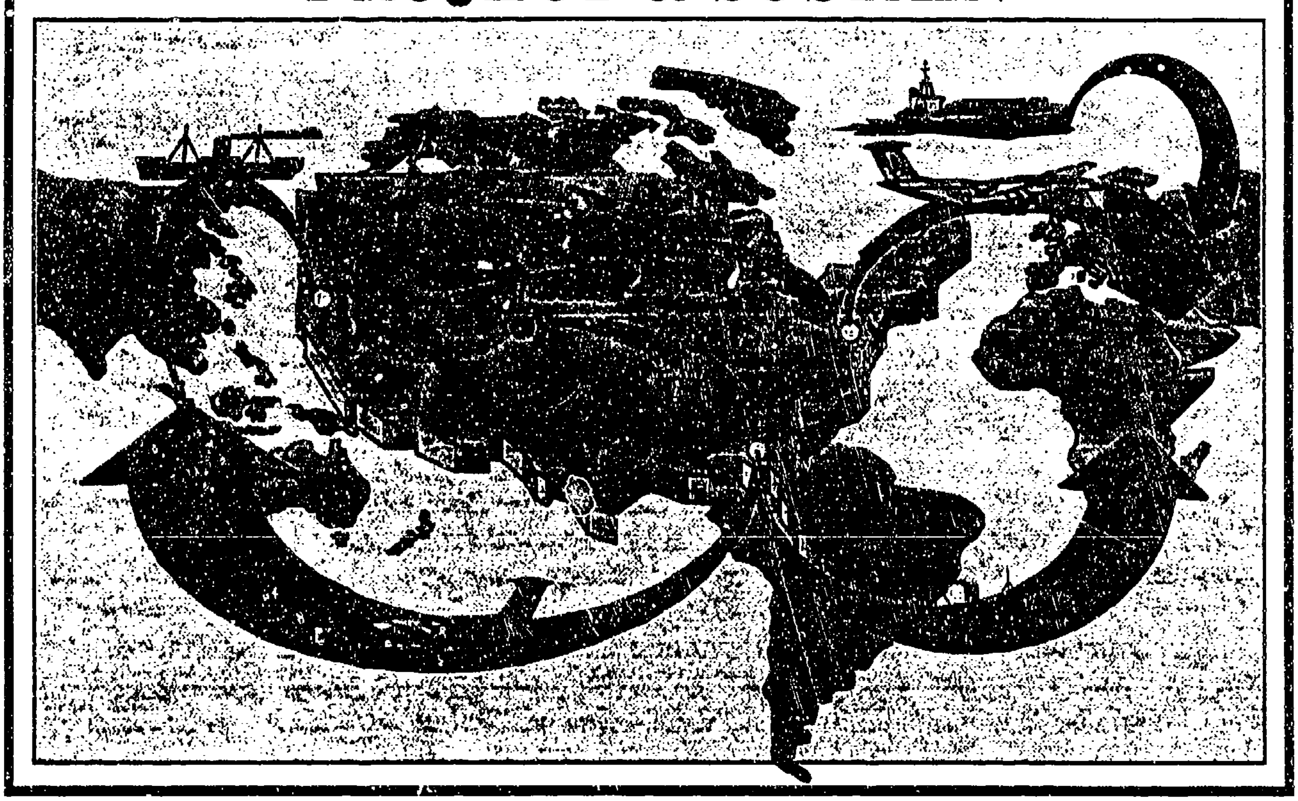
An automated threat location capability is key to Force XXI maneuver force requirements. As a result of the Army's digitization efforts, fusion of data from increasing and improving battlefield sensor suites will make the common picture of the battlefield available to maneuver force commanders. Digitization also enables massing fires without massing forces, thus increasing survivability. The delayed fielding of key digital systems, such as the RAH-66 Comanche, the Long Range Advanced Scout Surveillance System, and AFAS will limit the degree of integration achieved to dominate the maneuver battle.

Dominate the Maneuver Battle is rated AMBER in the near-, mid-, and far-terms. Shortfalls in research and development funds to improve capabilities and inadequate funding to procure new digital systems and enhancements for all Force Packages 1, 2, and 3 units keeps this objective AMBER.

SUMMARY

Force XXI is the Army's vision of warfighting in the 21st Century. Force modernization is critical to meet Force XXI objectives. As the assessment indicates, there are significant shortfalls in some of the Army's modernization and core programs. However, whenever possible, the Army will continue to invest in future technology focused toward achieving Force XXI.

PROJECT & SUSTAIN



PROJECT AND SUSTAIN the FORCE

NEAR-TERM ASSESSMENT	FY 95-96	AMBER
MID-TERM ASSESSMENT	FY 97-00	AMBER
FAR-TERM ASSESSMENT	FY 01-09	AMBER

WHAT THE POM BUYS FOR PROJECT & SUSTAIN

Force Pkg % Assessment as of FY 01

PROJECT

	96 BUDGET REQUEST	96 97 98 99 00 01	I	II	III	IV
RAIL	15.5(M)		100	N/A	N/A	N/A
C-17	3.3(B)	(AF Program)	N/A	N/A	N/A	N/A
LMSR	615.2(M)	(Navy Program)	N/A	N/A	N/A	N/A
LOTS	16.9(M)		71	N/A	N/A	N/A

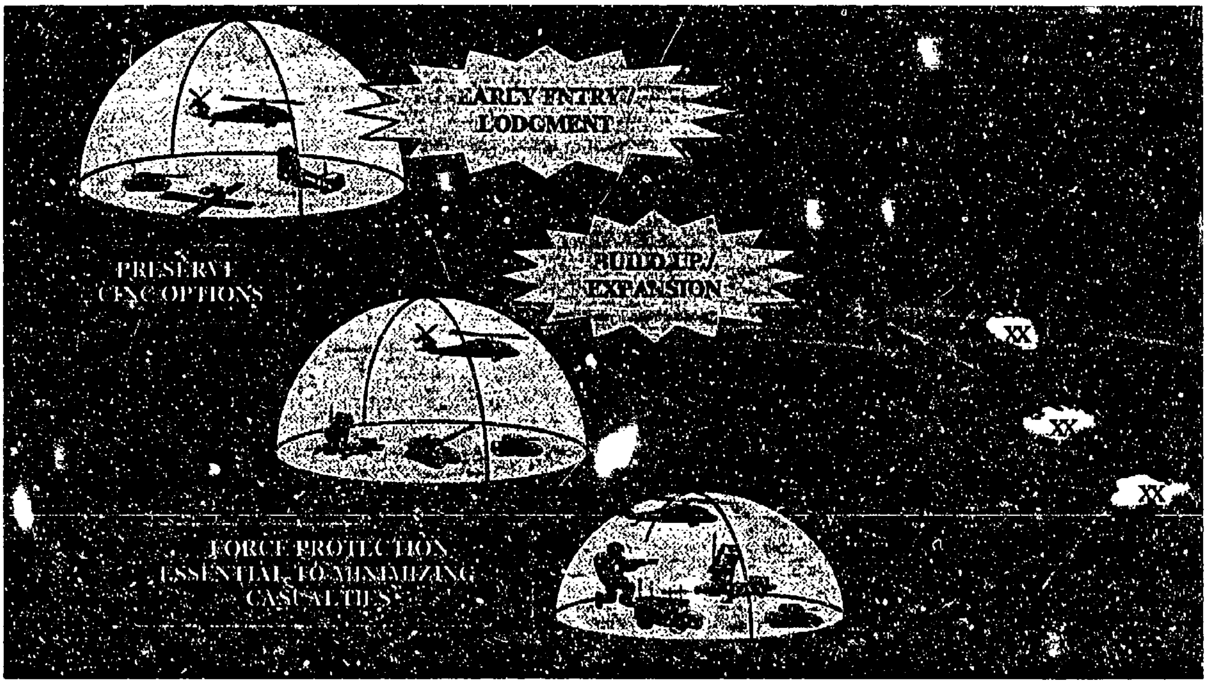
SUSTAIN

	96 BUDGET REQUEST	96 97 98 99 00 01	I	II	III	IV
PLS	78.4(M)		100	100	100	64
FMTV	40.8(M)		76	0	0	0
UH60A UH60L	383.3(M)		100	100	90	0
CH-47D	16.4(M)		100	100	100	N/A
TDS	25.5(M)		100	100	0	0
TACTICAL QUIET GENERATORS	15.0(M)		100	10	0	0
CSSCONTROL SYSTEM	19.7(M)		100	0	0	0
HEAVY HMMWV	24.8(M)	*	N/A	N/A	N/A	N/A
FORCE PROVIDER	14.3(M)		69	N/A	N/A	N/A
PPC4I	124.8(M)		100	10	0	0
AGCCS	21.0(M)		N/A	N/A	N/A	N/A
RCAS	83.2(M)		N/A	N/A	N/A	N/A
DMS	8.0(M)		N/A	N/A	N/A	N/A
SBIS	94.4(M)		100	100	100	N/A

RDTE
PROD/SUSTAINMENT
FUE

*Not fielded by Force Package, fills 65% of projected requirement.

PROTECT THE FORCE



PROTECT THE FORCE

NEAR-TERM ASSESSMENT	FY 95-96	AMBER
MID-TERM ASSESSMENT	FY 97-00	AMBER
FAR-TERM ASSESSMENT	FY 01-09	AMBER

WHAT THE POM BUYS FOR PROTECT

DETECT

Force Pkg % Assessment as of FY 01

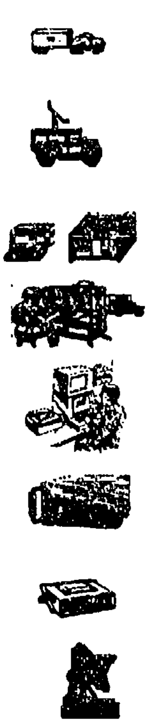
System	96 BUDGET REQUEST	96	97	98	99	00	01	I	II	III	IV
TENCAP	57.7(M)							100	80	80	N/A
JSTARS GSM	105.4(M)						**	80	80	80	N/A
RAH-66	200.0(M)							0	0	0	0
GRCS	60.2(M)							100	85	85	N/A
GBCS	58.9(M)							100	10	0	0
UAV CR	40.7(M)							45	0	0	0
UAV SR	67.7(M)							100	25	0	N/A
AQF	38.0(M)							67	0	0	0
ARL	18.4(M)							67	0	0	0
GBS	47.3(M)							100	100	40	0
TMD/GBR	611.2(M)		UOES				*	100	0	0	0

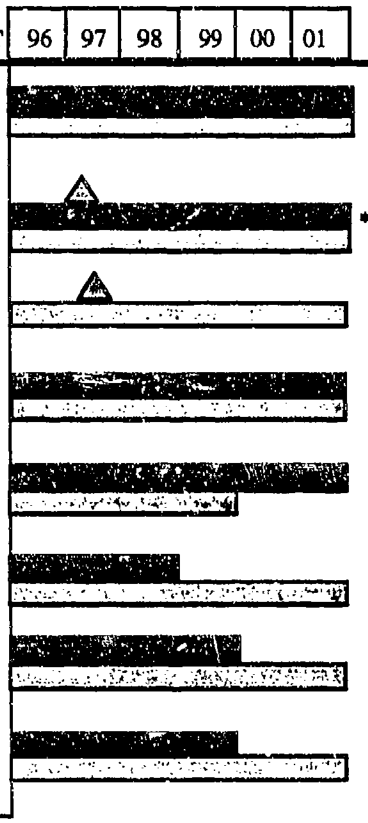
RDTE
PROD/SUSTAINMENT
FUE
UOES

*BMDO Funded.
**Joint Program.

WHAT THE POM BUYS FOR PROTECT

INTEGRATE



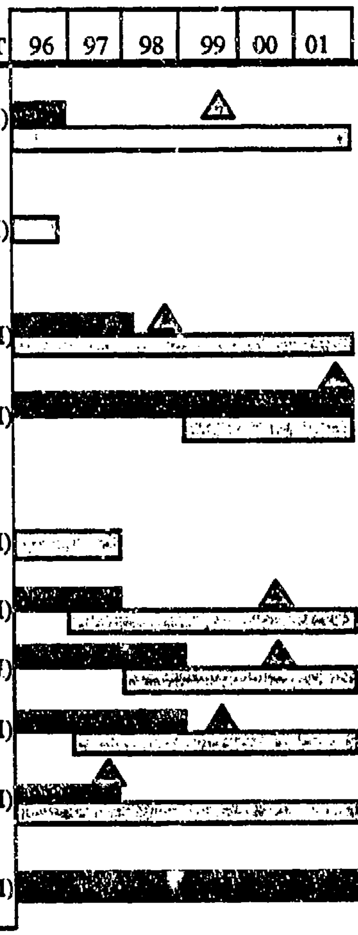


	96 BUDGET REQUEST	Force Pkg % Assessment as of FY 01: I	II	III	IV
TENCAP	57.7(M)	100	80	80	N/A
JSTARS/ GSM	105.4(M)	80	80	80	N/A
3 Channel /CTT	12.7(M)	60	60	60	0
ASAS	65.6(M)	100	100	100	N/A
FAADC21	56.5(M)	100	100	40	0
ADDS	26.8(M)	80	0	0	0
GPS	39.8(M)	100	100	100	0
TROJAN SPIRIT	21.6(M)	100	100	100	N/A

■ RDTE
□ PROD/SUSTAINMENT
△ FUE
* Joint Program.

WHAT THE POM BUYS FOR PROTECT

DESTROY



	96 BUDGET REQUEST	Force Pkg % Assessment as of FY 01: I	II	III	IV
SADARM	40.9(M)	7	N/A	N/A	N/A
ATACMS BLK I	53.5(M)	100	N/A	N/A	N/A
BLK IA	80.5(M)	81	N/A	N/A	N/A
BLK II BAT	193.3(M)	25	N/A	N/A	N/A
MLRS LAUNCHER	53.4(M)	100	100	71	0
MLRS IFCS	34.4(M)	100	89	0	0
MLRS ILMS	16.0(M)	100	2C	0	0
ERR-MLRS	21.4(M)	7	N/A	N/A	N/A
AH-64 C/D	378.4(M)	50	0	0	0
RAH-66	200.0(M)	0	0	0	0

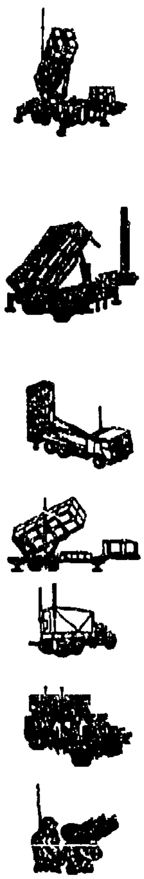
RDTE

PROD/SUSTAINMENT

FUE

WHAT THE POM BUYS FOR PROTECT

DEFEND



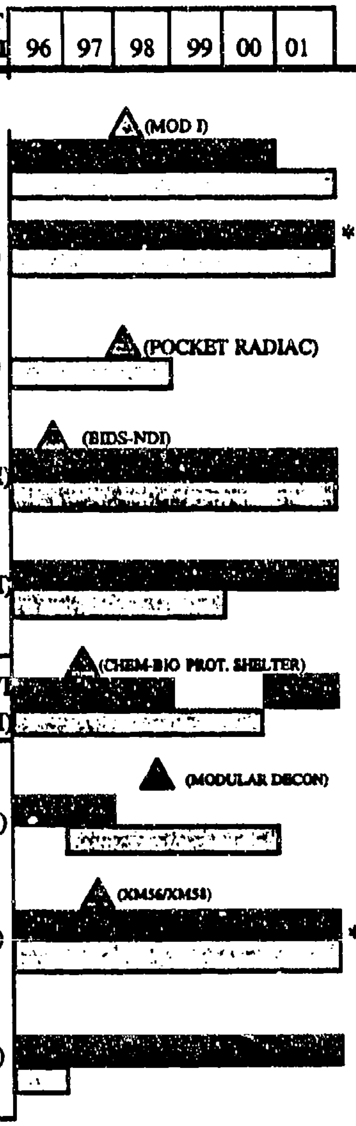
	96 BUDGET REQUEST	Force Pkg % Assessment as of FY 01: I	II	III	IV
BMDO					
PATRIOT PAC III / ERINT	691.8(M)	100	100	100	N/A
THAAD	423.5(M)	0	0	0	0
THAAD GBR	187.7(M)	0	0	0	0
CORPS SAM	30.6(M)	0	0	0	0
ARMY					
PATRIOT	31.5(M)	100	100	100	N/A
JTAGS	30.9(M)	100	N/A	N/A	N/A
AVENGER	32.5(M)	100	100	30	0
STINGER-RMP	14.3(M)	100	100	100	0

Years: 96 97 98 99 00 01

RDTE
PROD/SUSTAINMENT
FUE
UOES
*BMDO Funded.

WHAT THE POM BUYS FOR PROTECT

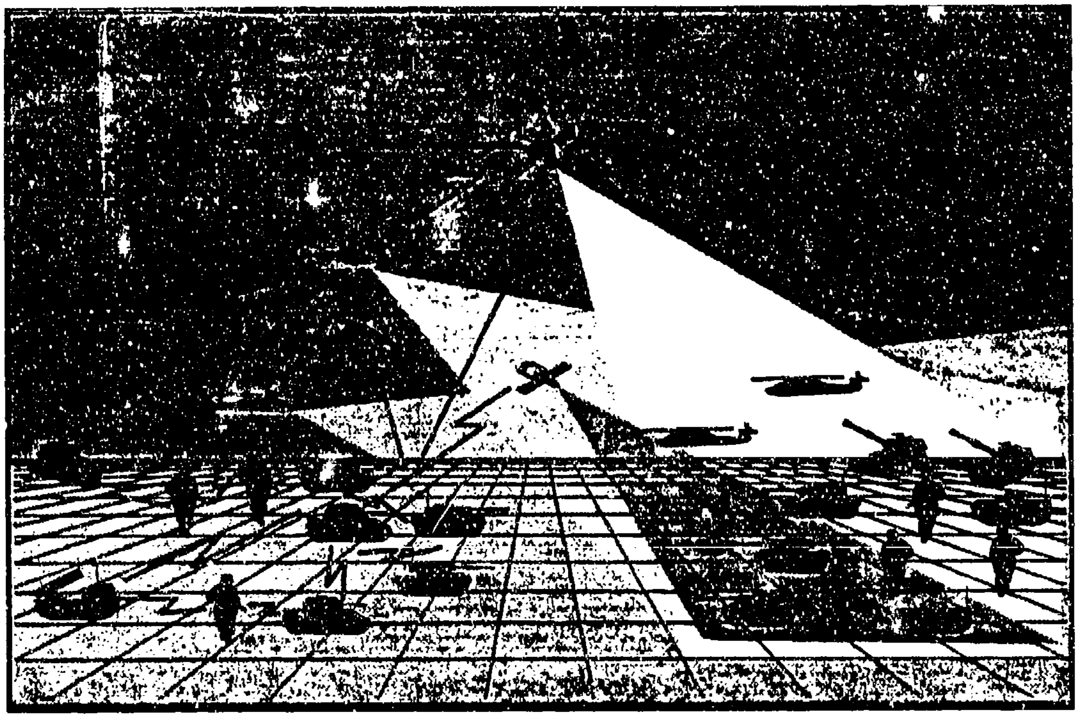
SURVIVE



	96 BUDGET REQUEST	Force Pkg % Assessment as of FY 01: I	II	III	IV
CONTAMINATION AVOIDANCE					
NBC RECON (INCLUDES FOX)	61.4(M)	100	7	0	0
CHEMICAL DETECTION	34.3(M)*	78	33	0	0
NUCLEAR DETECTION	3.7(M)	100	85	67	67
BIOLOGICAL DETECTION (BIDS)	50.7(M)	100	100	N/A	N/A
PROTECTION*					
SOLDIER MASK/ CLOTHING	31.8(M)	100	100	100	100
INTEGRATED COLLECTIVE PROTECTION	21.1(M)	50	0	0	0
MODULAR DECON-TAMINATION	4.0(M)	100	100	90	0
SMOKE	40.7(M)*	100	100	100	73
GROUND VEHICLE COMBAT ID	35.0(M)	0	0	0	0

■ RDTE ▲ FUE
□ PROD/SUSTAINMENT *Multiple Systems.

WIN INFORMATION WAR



WIN THE INFORMATION WAR

NEAR-TERM ASSESSMENT	FY 95-96	AMBER
MID-TERM ASSESSMENT	FY 97-00	AMBER
FAR-TERM ASSESSMENT	FY 01-09	AMBER

WHAT THE POM BUYS
FOR WIN THE INFORMATION WAR

SENSORS

Force Pkg % Assessment as of FY 01

System	96 BUDGET REQUEST	96	97	98	99	00	01	I	II	III	IV
JSTARS GSM	105.4(M)						*	80	80	80	N/A
UAV (CR)	40.7(M)							45	0	0	0
UAV (SR)	67.7(M)							100	25	0	N/A
TENCAP	57.7(M)							100	80	80	N/A
RAH-66	200.0(M)							0	0	0	0
AQF	38.0(M)							67	0	0	0
GBCS	58.9(M)							100	10	0	0
GRCS	60.2(M)							100	85	85	N/A
ARL	18.4(M)							66	0	0	0
GBS	47.3(M)							100	100	40	0

EW SYSTEMS

System	96 BUDGET REQUEST	I	II	III	IV
GBCS	58.9(M)	100	10	0	0
AQF	38.0(M)	67	0	0	0

RDTE

PROD/SUSTAINMENT

FUE *Joint Program.

WHAT THE POM BUYS FOR WIN THE INFORMATION WAR

C4I SYSTEMS

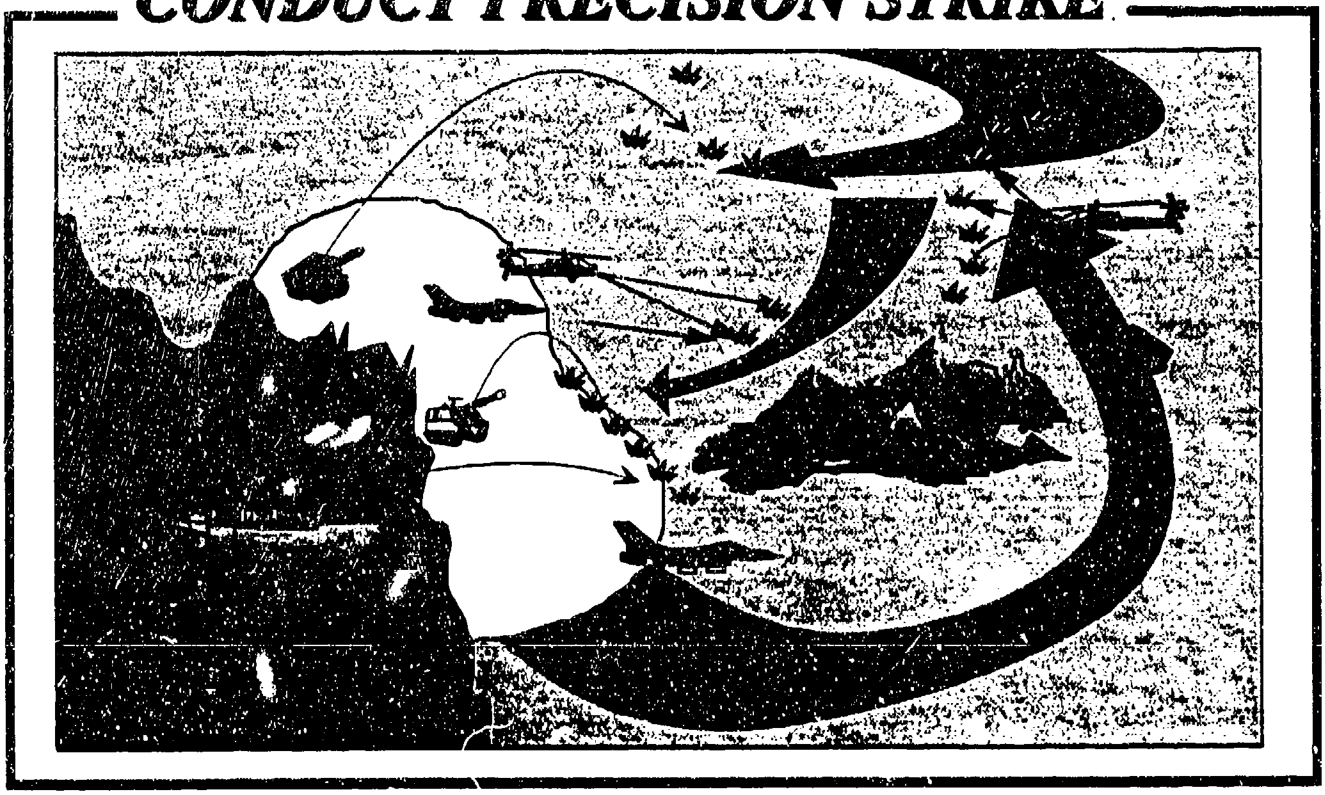
Force Pkg % Assessment as of FY01

System	96 BUDGET REQUEST	I	II	III	IV
MCS (v.12)	38.1(M)	100	0	0	0
AFATDS	73.9(M)	100	100	50	0
FAADC2I	56.7(M)	100	100	40	0
ASAS	65.6(M)	100	100	100	N/A
CSSCS	19.7(M)	100	0	0	0
SINCGARS	347.4(M)	100	100	100	73
MSE	18.3(M)	100	100	100	100
SMART-T	88.6(M)	100	40	0	0
SCAMP	36.0(M)	100	0	N/A	N/A
SICPS	31.6(M)	100	100	92	80
ADDS	26.8(M)	80	0	0	0
TROJAN SPIRIT	21.6(M)	100	100	100	N/A
GPS	39.8(M)	100	100	100	0
INFOSEC	15.3(M)	65	0	0	0
AGCCS	21.0(M)*	N/A	N/A	N/A	N/A
CTT (3 CHANNEL)	12.7(M)	60	60	60	0
A2C2S	4.0(M)	50	0	0	0
IMETS	7.0(M)	100	100	100	0

Fiscal years: 96 97 98 99 00 01

RDTE PROD/SUSTAINMENT FUE *Not Fielded by Force Package.

CONDUCT PRECISION STRIKE



CONDUCT PRECISION STRIKE

NEAR-TERM ASSESSMENT	FY 95-96	AMBER
MID-TERM ASSESSMENT	FY 97-00	AMBER
FAR-TERM ASSESSMENT	FY 01-09	GREEN

WHAT THE POM BUYS FOR CONDUCT PRECISION STRIKE

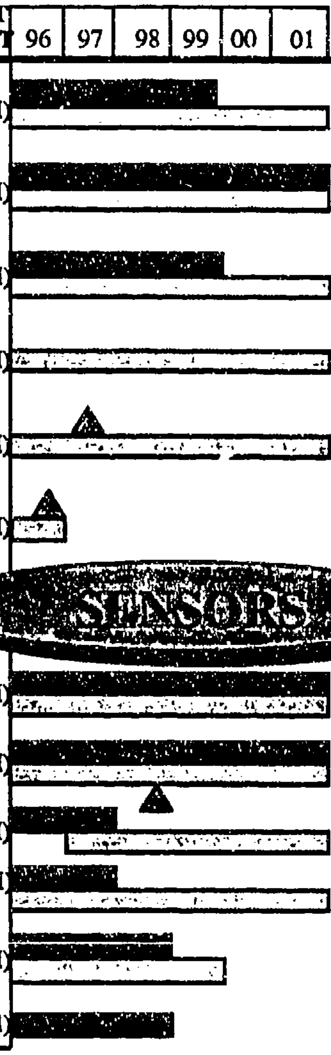
C4I SYSTEMS

Force Pkg % Assessment as of FY 01

System	96 BUDGET REQUEST	I	II	III	IV
GPS	39.8(M)	100	100	100	0
AFATDS	74.4(M)	100	100	50	0
SINCGARS	347.4(M)	100	100	100	73
MSE	18.3(M)	100	100	100	100
GRCS/CTT (3 CHANNEL)	12.7(M)	60	60	60	0
JTAGS	30.9(M)	100	N/A	N/A	N/A

SENSORS

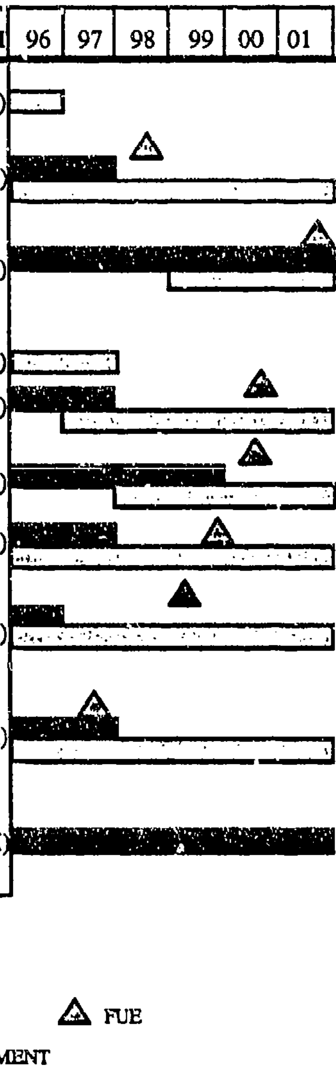
System	96 BUDGET REQUEST	I	II	III	IV
TENCAP	57.7(M)	100	80	80	N/A
JSTARS GSM*	105.4(M)	80	80	80	N/A
UAV(CR)	40.7(M)	45	0	0	0
UAV(SR)	67.7(M)	100	100	100	N/A
GRCS	60.2(M)	100	85	85	N/A
ARL	18.4(M)	66	0	0	0



RDTE
PROD/SUSTAINMENT
FUE
*Joint Program.

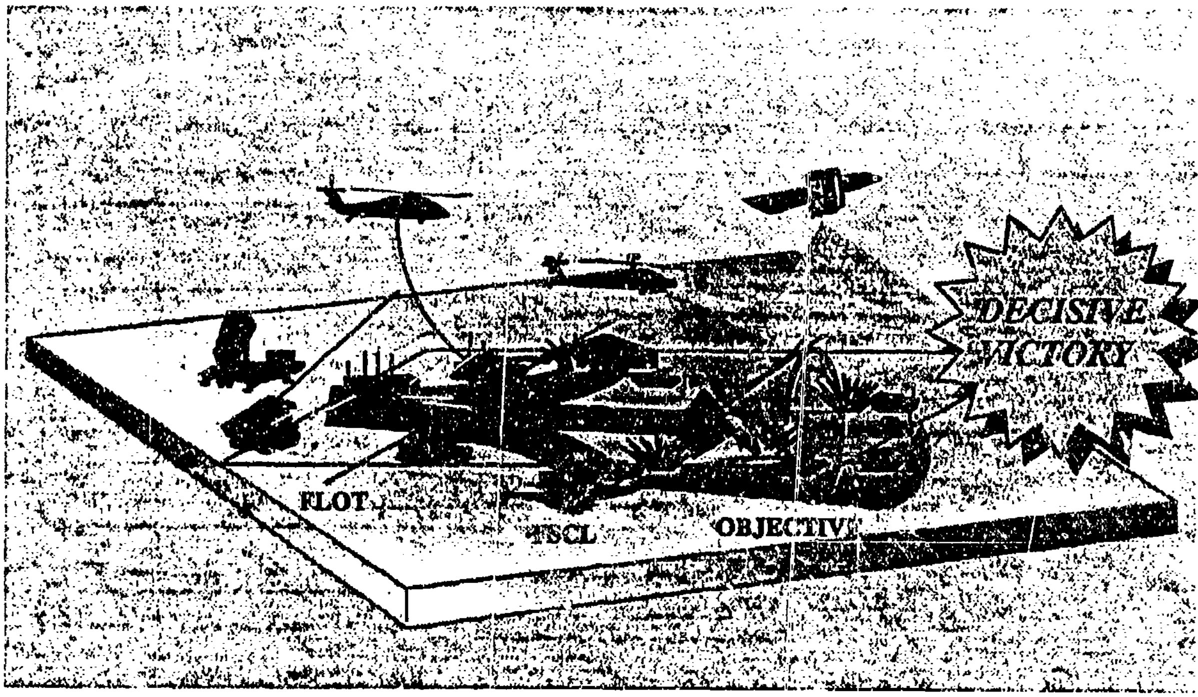
WHAT THE POM BUYS FOR CONDUCT PRECISION STRIKE

SHOOTERS



	96 BUDGET REQUEST	Force Pkg % Assessment as of FY 01: I	II	III	IV
ATACMS BLK I	53.5(M)	100	N/A	N/A	N/A
BLK IA	80.5(M)	81	N/A	N/A	N/A
BLK II BAT	193.3(M)	25	N/A	N/A	N/A
MLRS	53.4(M)	100	100	71	0
MLRS IFCS	34.4(M)	100	89	0	0
MLRS ILMS	16.0(M)	100	20	0	0
ERR-MLRS	21.4(M)	7	N/A	N/A	N/A
SADARM	40.9(M)	7	N/A	N/A	N/A
AH-64 C/D	378.4(M)	50	0	0	0
RAH-66	200.0 (M)	0	0	0	0

DOMINATE the MANEUVER BATTLE



DOMINATE THE MANEUVER BATTLE

NEAR-TERM ASSESSMENT	FY 95-96	AMBER
MID-TERM ASSESSMENT	FY 97-00	AMBER
FAR-TERM ASSESSMENT	FY 01-09	AMBER

WHAT THE POM BUYS FOR DOMINATE MANEUVER

MANEUVER

Force Pkg % Assessment as of FY 01

System	96 BUDGET REQUEST	I	II	III	IV
M1A2	535.5(M)	70	0	0	N/A
AGS	188.8(M)	76	N/A	N/A	N/A
BRADLEY (M2/3A2)	137.6(M)	N/A	N/A	54	0
(M2/3A2 ODS)	37.5(M)	100	100	51	N/A
(M2/3A3)	116.1(M)	38	0	0	N/A
ITAS	56.8(M)	96	0	0	0
JAVELIN	171.4(M)	100	69	0	0
LOSAT	14.7(M)	N/A	N/A	N/A	N/A
PLS	90.0(M)	100	100	100	64
C2V	20.3(M)	47	0	N/A	N/A
FMTV	40.8(M)	76	0	0	0
MCS (V.12)	38.1(M)	100	0	0	0
GPS	39.8(M)	100	100	100	0
THERMAL WEAPON SIGHT	23.0(M)	100	0	5	0
ENHANCED LAND WARRIOR	25.9(M)	N/A	N/A	N/A	N/A
120 mm MORTAR	8.0(M)	100	100	100	50
M113A3	40.3(M)	100	60	10	40
Multi-Purpose Individual Munition	12.3(M)	21	N/A	N/A	N/A
AN/PVS7	36.9(M)	100	100	27	27

AVIATION

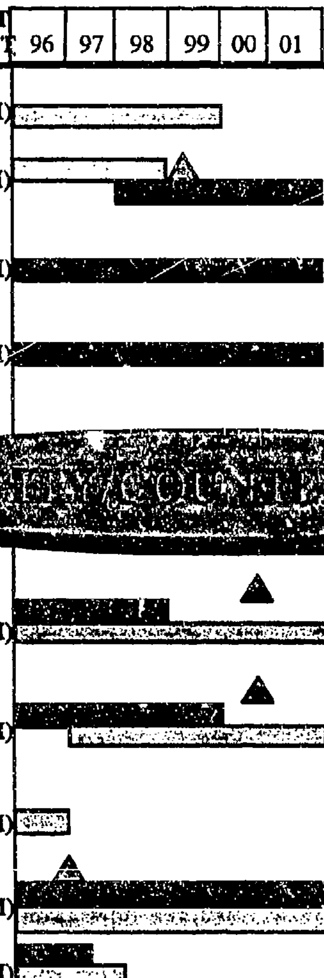
System	96 BUDGET REQUEST	I	II	III	IV
OH-58D	78.7(M)	95	73	0	0
RAH-66	200.0(M)	0	0	0	0
AH-64C/D	378.4(M)	50	0	0	0
UH60 A/L	383.3(M)	100	100	90	0

RDTE
PROD/SUSTAINMENT
FUE

WHAT THE POM BUYS FOR DOMINATE MANEUVER

FIRE POWER

Force Pkg % Assessment as of FY 01



	96 BUDGET REQUEST	I	II	III	IV
M109A6	222.7(M)	100	100	N/A	N/A
BFIST	23.2(M)	95	0	0	0
AFAS	147.8(M)	0	0	0	0
FARV	71.0(M)	0	0	0	0

MOBILITY/COUNTERMOBILITY

	96 BUDGET REQUEST	I	II	III	IV
HEAVY ASSAULT BRIDGE	25.7(M)	15	0	0	0
M1 BREACHER	16.5(M)	23	0	0	0
VOLCANO	1.0(M)	100	100	100	98
WAM	36.4(M)	28	0	0	0
DEUCE	10.4(M)	76	0	0	0

■ RDTE
△ FUE
□ PROD/SUSTAINMENT

CONCLUSION

> *"America's Army is made up of the finest soldiers the world has ever seen. ...They are ready to respond to the nation's call, wherever our country needs them to go, whatever our country needs them to do. ...We owe it to those soldiers--and to America's soldiers of the 21st Century--to provide them with the best and most lethal weapons systems and equipment in the world."*
>
> GEN Gordon R. Sullivan
> Chief of Staff, Army

The Army is committed to modernizing to ensure the Nation possesses the most modern, well trained, and ready force in the world. The Army must be a better Army. The size of the force dictates that technology must provide us the advantages needed to fight outnumbered and win. Given the decline in the Army's Total Obligation Authority and its impact on research, development, and acquisition, we have a daunting challenge. Tough decisions have been made: to reduce force structure, cancel programs, delay or extend others. The Nation deserves an Army capable of projecting Land Force Dominance. To meet the challenges for the 21st Century, the Army has embarked on a course which will result in Force XXI. Continued support for Army modernization will not only produce a better Army, but *the Force* for the coming century--an Army committed to readiness, its soldiers, and the American people.

FORCE XXI

ANNEX A

FORCE STRUCTURE

ANNEX A

FORCE STRUCTURE

INTRODUCTION

"The U.S. Army is a changed Army - changed to meet the challenges of the 21st Century. But that change has not eclipsed the essential nature of your Army that has been with the Nation since birth. Service to the Nation - Duty, Honor, Country, selfless service - an example of a democratic army to the world - these things will never change."

GEN Gordon R. Sullivan
Chief of Staff, Army
October 1993

Force Structure Overview

The U.S. Army is undergoing its most significant change since the end of World War II. It is being transformed from a Cold War Army -- one focused on a large, monolithic Soviet global power -- to a Power Projection Army. It will have limited forward deployments, and will be primarily stationed and supported from the continental United States.

The DoD Bottom Up Review and subsequent Defense Planning Guidance (DPG) reduce the active Army to ten divisions. Dollar constraints limit active Army end strength to 495,000.

The Army's primary mission remains to fight and win the Nation's wars. As outlined in the evolving National Military Strategy, the most demanding of the Army's potential missions is fighting two near-simultaneous major regional contingencies. However, to be able to respond quickly to the wide variety of possible missions across the range of conflict, the active Army must be structured with heavy, light and special operations forces.

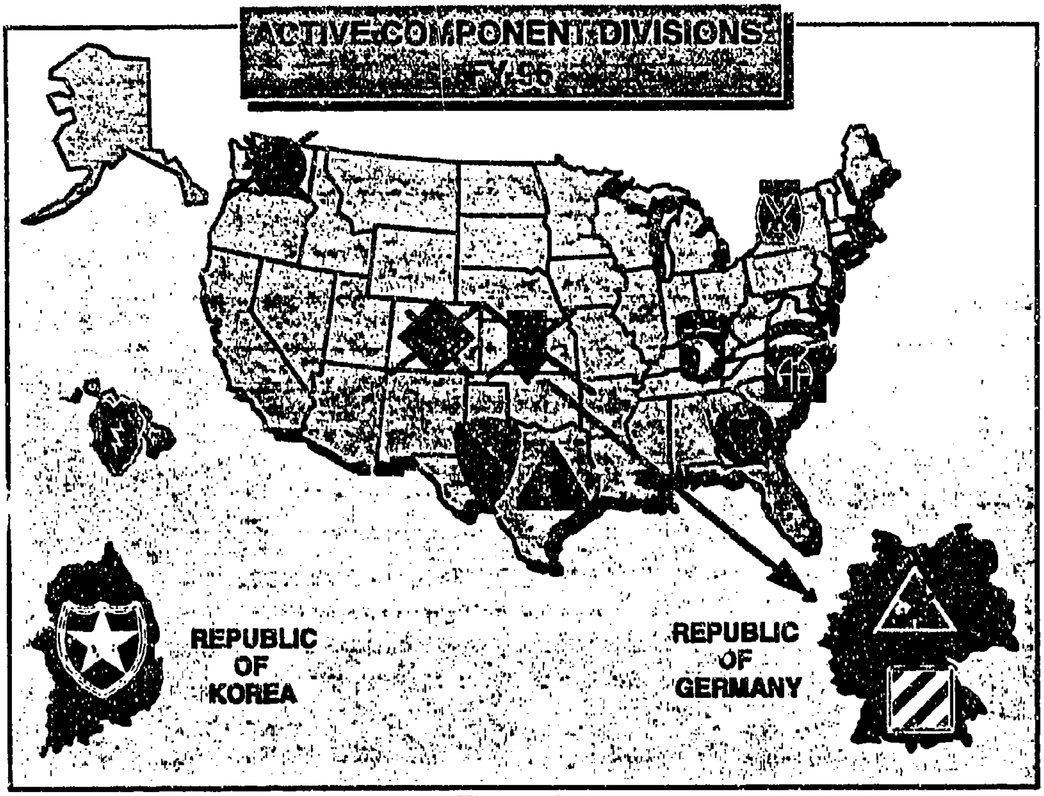


Figure A-1

By the end of FY 96, the active Army will reach the objective end strength (Figure A-1). This end strength provides a force structure of four corps and ten divisions - 6 heavy, 2 light, 1 airborne and 1 air assault. The divisions are complemented by the Ranger Regiment and 5 Special Force Groups. In addition to the combat force the active Army also consists of the Institutional, or TDA Army which is responsible for both generating and sustaining the force in peace and war. Active Component forces are backed by combat, combat support and combat service support structure in the Reserve Component (RC). RC end strength will reduce to 575,000 by the end of FY 98.

The 1996 force structure provides the point of departure for Force XXI, the emerging tenets of which will set the azimuth for modernization of the Army into the early part of the 21st Century. One of the principal features of the future Army will be its ability to exploit information. The enhanced capability derived from information and digital technology will greatly influence the doctrinal design of the Force XXI Army. The knowledge-based, modular, tailorable Army of the 21st Century is expected to be more lethal, mobile and survivable. Those characteristics will enable the Force XXI Army to respond more efficiently and effectively to the challenges of the post-Cold War security environment.

"In some ways, America's Army will be as different from the Army of Desert Storm as Marshall's World War II Army was different from Grant's Army of the Potomac. New ways of viewing the world, new missions, new ways to accomplish those missions, new technologies, and new ways of doing business are all part of a deliberate transformation that is fundamentally changing every aspect of the Army."

HON Togo D. West, Jr. & GEN Gordon R. Sullivan
FY 95 Army Posture Statement

Force Structure and the Force XXI Campaign Plan

To be prepared for the future we must plan and prepare now. The spirit of this vision and preparation can be found in the Force XXI Campaign Plan. The Army's redesign effort is well on its way and is illustrated in the three axes of the Force XXI Campaign Plan. These three main objectives incorporate three complementary and interactive efforts.

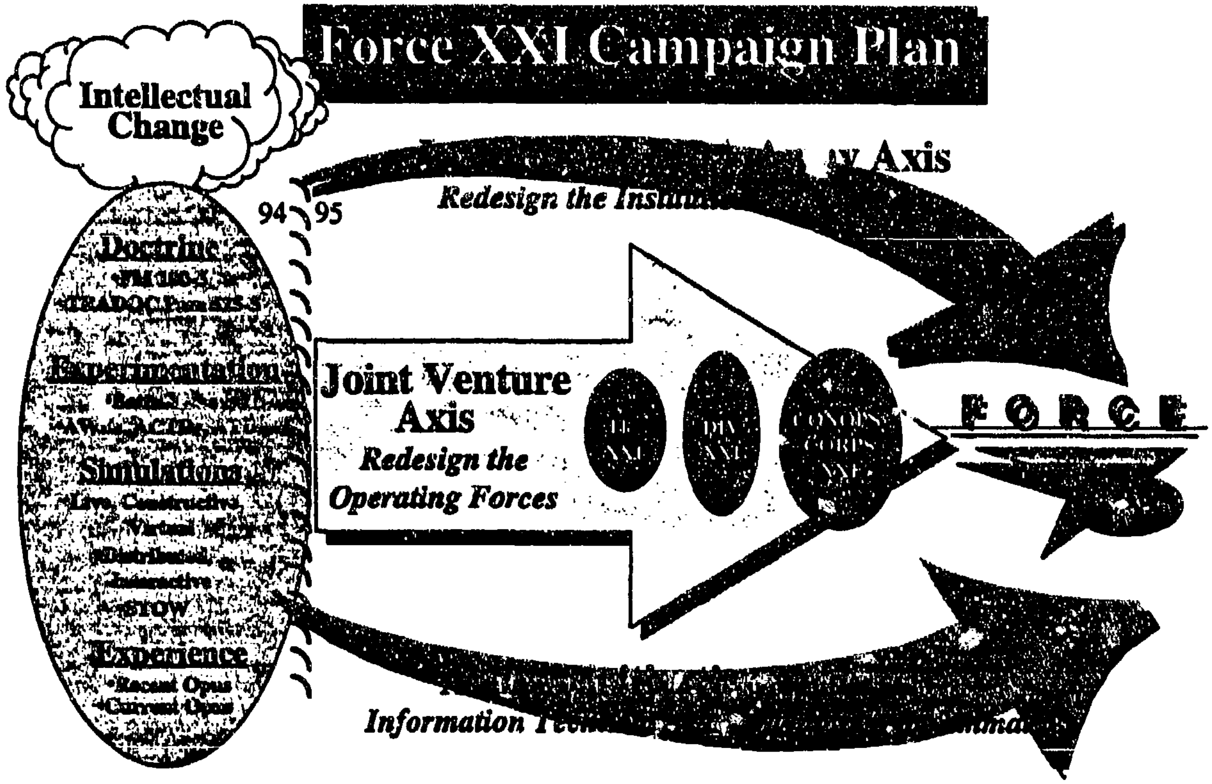


Figure A-2

The first and most important effort, called "Joint Venture", focuses on redesigning the operational forces of the Army. Joint Venture encompasses intellectual change, rigorous analysis, and is defined as the experimental and conceptual axis of the Campaign Plan. This effort develops the basic organization and operational concept of Force XXI from the smallest unit to echelons above corps (EAC). It is a partnership effort led by TRADOC with membership from leading Army organizations.

its purpose is to ensure the Army is properly organized for the full range of multi-dimensional operations. Redesigning the division and below is the core focus of Joint Venture and producing the best possible operating force will be its initial goal. The challenge is to develop the intellectual basis for warfighting; its force design; and then test these hypotheses through experiments, simulations and models.

Support of the Joint Venture axis will ensure that the TOE Army of the future is provided the appropriate Doctrine, Organization, Training, Leader Development, Materiel, and Soldier support (DOTLMS) to capitalize on the full capabilities of the deployed forces.

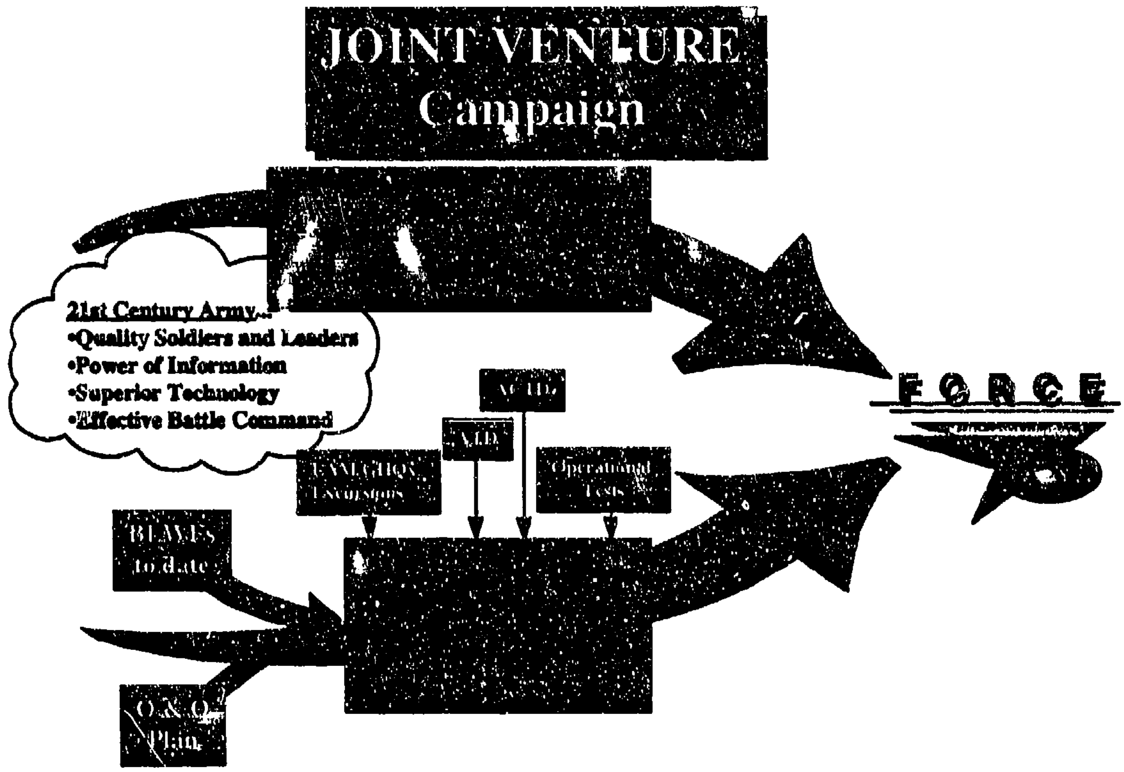


Figure A-3

The second axis is led by the Army's Vice Chief of Staff to reengineer the Institutional/TDA Army from the factory to the foxhole. This is the part of the Army responsive for generating and sustaining the operational forces. It will divest unnecessary force structure while retaining functionality with the proper balance of combat, combat support, combat service support and Special Operations forces. Its responsibilities can be grouped into four general categories:

- Creating the force -- recruiting, training, equipping;
- Generating the force -- mixing, projecting, supporting;

- Sustaining the force -- supplying, servicing, maintaining; and
- Structuring the force -- organizing, balancing, planning.

Continuing efforts will lead to the development of a common base support structure for the deployed operational Army. Infrastructure is a crucial strategic capability that supports how the Army organizes, trains, and equips itself to accomplish its many missions. When completed these efforts will demonstrate a seamless, connectivity between the Institutional and Operational forces.

The Army of the 21st Century accommodates the constraints imposed by decreasing budgets and related reductions in manpower. But most importantly, Force XXI focuses on numerous current and emerging technologies which offer quantum advances in operational capabilities for the Army. They will permit the Army to generate greater levels of combat power. Projecting from the United States, the Army will provide the necessary forces possessing the organizational agility and versatility necessary to respond to an increasingly broader range of missions. Most importantly these units will be properly organized and outfitted with the technical advantages over their enemy.

INSTITUTIONAL/TDA REDESIGN AXIS

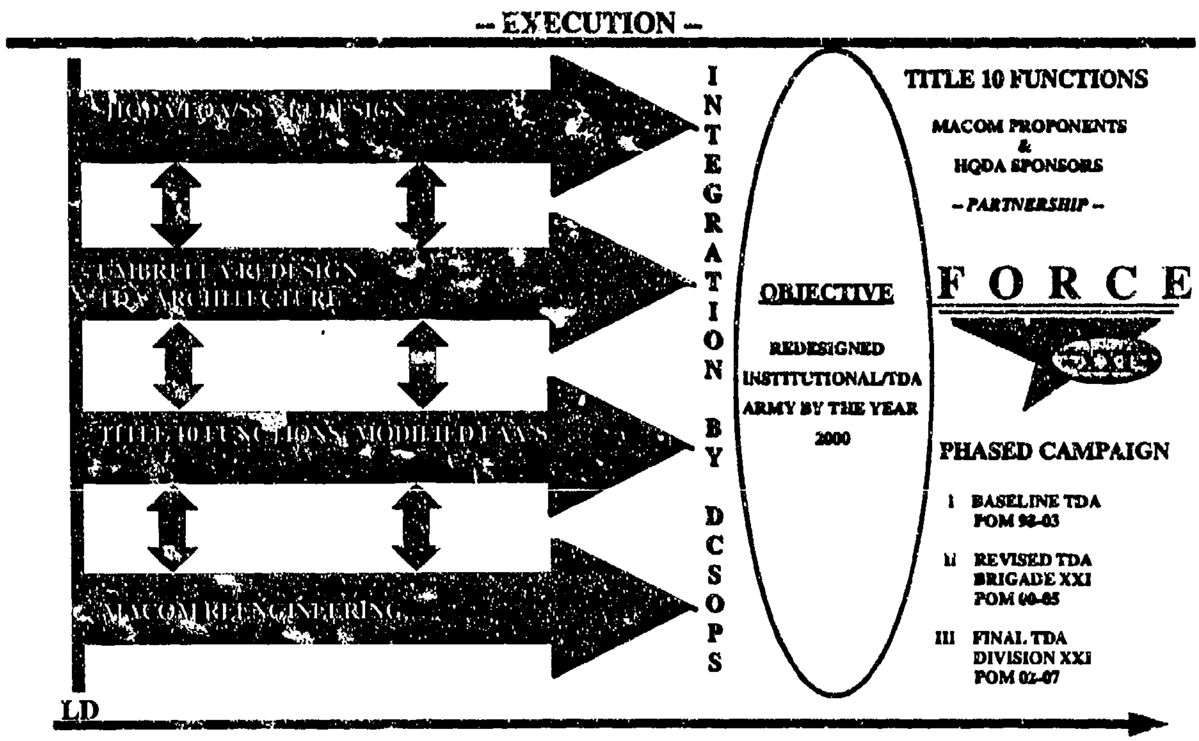


Figure A-4

Force XXI enhances our capability to task organize forces better; because Army units in the future will possess mutual command and control, communications and intelligence means. Units will be more modular and will prove to be more adaptable. Further, the Army will provide digital connectivity between the proper mix of Active and Reserve Component units. This will provide the appropriate balance of combat, combat support, combat service support units organized to support joint and multinational operations in any theater.

In concert with the Force XXI Campaign Plan, by the year 2000 the Army will reengineer its institutional infrastructure necessary to perform its Title 10 responsibilities. The TDA Redesign Axis campaign, a vital part of the top-to-bottom, front-to-rear redefinition, will be conducted in three phases and employ four simultaneous and interrelated efforts:

1) MACOM Reengineering. Already in progress is the internal reengineering efforts of the major commands (MACOMS, i.e., TRADOC, FORSCOM, AMC, etc.) as part of an integrated effort into the infrastructure redesign activities.

2) The Functional Area Assessment (FAA) process. A complementary forum to develop and process redesign issues for Service Title 10 functions.

3) Redesign of HQDA. This effort also includes its field operating agencies (FOA) and staff support activities (SSA) which will be part of the initial redesign phase.

4) Umbrella Redesign. An effort to integrate the results of the FAA and interface with the overall redesign and digitization of the warfighting Army.

Base Realignment and Closure (BRAC) decisions and/or laws will be reviewed and appropriately reconciled throughout the campaign effort. Decisions made on relevant emerging issues will be entered in the FY 97 budget submission and later redesign efforts will be integrated into following POM. Redesign reviews will address a complete assessment of all Title 10 functional areas. The Army will then perform an integrated assessment of required organizational structure and prioritize its resources of military personnel, civilians, contracts, and dollars.

The third and final axis is the Army Digitization Office (ADO). It provides the management structure to ensure the acquisition process develops a digitized force capable of exploiting the value of the information age. Future architectures will be based upon a robust, versatile concept of information based battle command. This is an extremely challenging requirement, due to the technical complexity of attempting to integrate fielded platforms and systems, which use older technology and software languages, with new and future systems, which will use software that may not be written yet. The ADO has the authority to coordinate actions of the acquisition officials toward integrating user requirements. To do this he must be able to react quickly, invest smartly and maintain flexibility to accept change and grow.

Reserve Components (RC)

An important component on the modern battlefield will be placed there by the U.S. Army Reserve (USAR) and Army National Guard (ARNG). Yet, they too are undergoing a significant restructuring process. Current Defense Planning Guidance (DPG) establishes a total end strength in FY 98 of 575,000 soldiers, a 25% decrease over the decade of the 1990s. Previous agreements established ARNG/USAR end strengths to 367,000 and 208,000, respectively. The end of the Cold War is beginning to highlight a previous American phenomenon; when the Reserve Component exceeds the active force by a considerable margin.

A 1993 agreement, involving the transfer of combat and combat service support force structure, produced a restructuring initiative that establishes the Reserve Component (RC) force realignment process. This initiative places the preponderance of RC combat power within the ARNG, while the USAR will provide a large majority of the combat support and combat service support. This agreement is being reflected in the FY 98 projections of eight ARNG divisions and 15 "enhanced readiness brigades." These units will be affiliated with Active Component divisions and corps for training and preparations. They are to be staffed and equipped to the same modernization level as their respective force package designation.

In order to support the realignment and reach the objective end strength, Reserve combat forces are being inactivated or moved to the ARNG. By the end of FY 95, three Army Reserve combat brigades will be inactivated, leaving only two combat battalions which will be inactivated in FY 97. The Army's biannual Total Army Analysis (TAA) will determine the required force structure to support the RC's commitment to CINC's warfighting requirements, while still maintaining appropriate levels and capabilities for domestic and state missions.

As part of the RC's restructuring process, increasing the level of Full Time Support (FTS) personnel is a high priority. The shortage of adequate FTS authorizations is one of the primary factors inhibiting higher readiness levels. The Army is complying with directed guidance to increase the level of FTS as a percentage of RC end strength. Full Time Support (FTS) is currently projected to be 10.4% for the USAR and 13.1% for the ARNG.

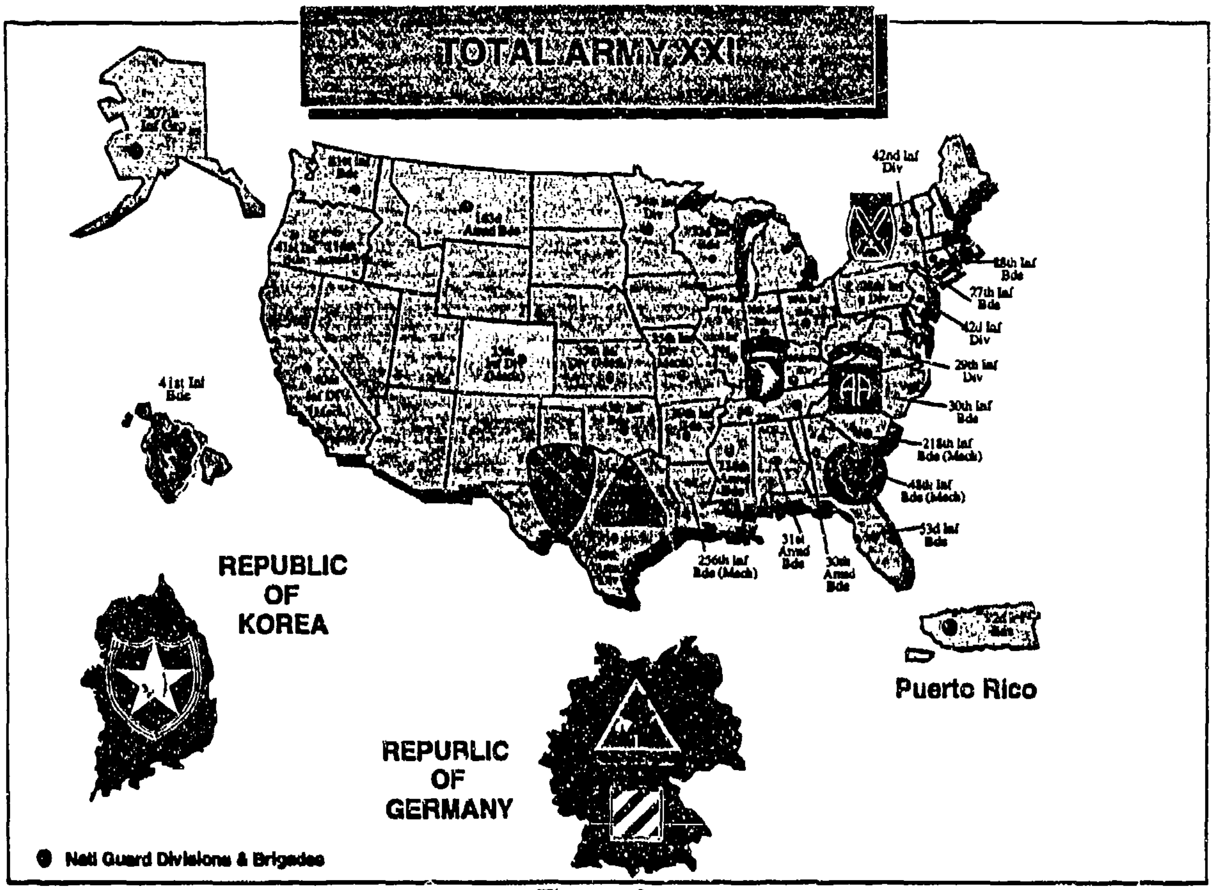


Figure A-5

Civilian Personnel

Department of the Army Civilians (DACs) are major contributors to the Army's mission. Civilians comprise approximately 20% of the overall work force (AC and RC) and fill vital positions in support of operations. Most importantly they provide stability and institutional knowledge, regardless of what organizational level they are assigned from senior management to administrative support. This is particularly true in that level of the work force which supports depot maintenance, supply, acquisition, training, medical care, research and development and facilities operations.

The Army's civilian strength level has and will be further reduced throughout this decade by over 170,000 personnel. This reduction reflects reduced funding, new force structure designs, mission support requirements and results of the base closure program. The DAC strength levels are a dependent variable related to the following factors: force structure changes; force management; funded workload; and Congressional ceilings and floors. Figure A-6 reflects the trends as currently projected through the programmed and planned years.

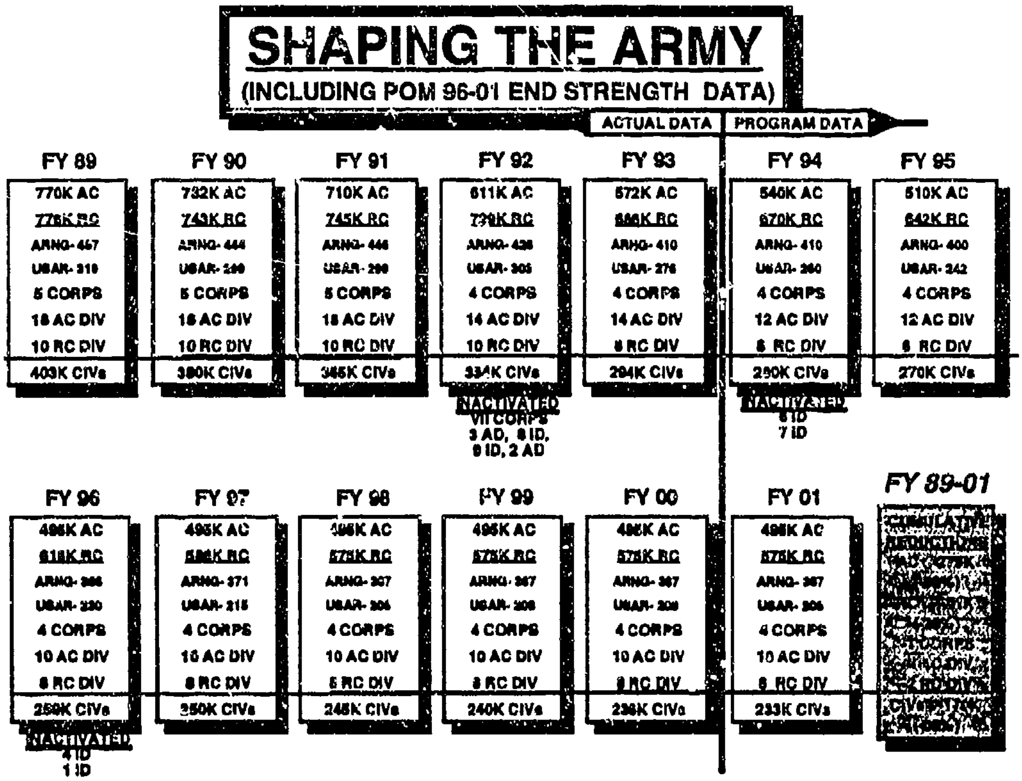


Figure A-6

When reviewing the force structure reductions in both the AC and RC, as discussed above, it is logical to state that the civilian force structure would also be reduced accordingly. However, it is important to understanding the meaning of a CONUS-based, Force Projection Army, and a careful review of the value of the overall infrastructure support base - primarily manned and operated by civilian personnel. This is of particular importance when you see that the overall tempo of Army missions and requirements has been increasing, not decreasing, since the end of the Cold War. Therefore, consistent and constant correlation - over an extended period of time - between AC/RC force structure and the civilian based support structure may put at risk the Army's readiness and operational capabilities. Further civilian strength reductions need to be measured on changes in roles and missions and the National Military Strategy. The trends of the overall force structure are displayed in Figure A-7 and reflect the Department of the Army plan to meet policy guidance and directions.

ARMY PERSONNEL STRENGTH
(1989 THRU 1995 - IN THOUSANDS)

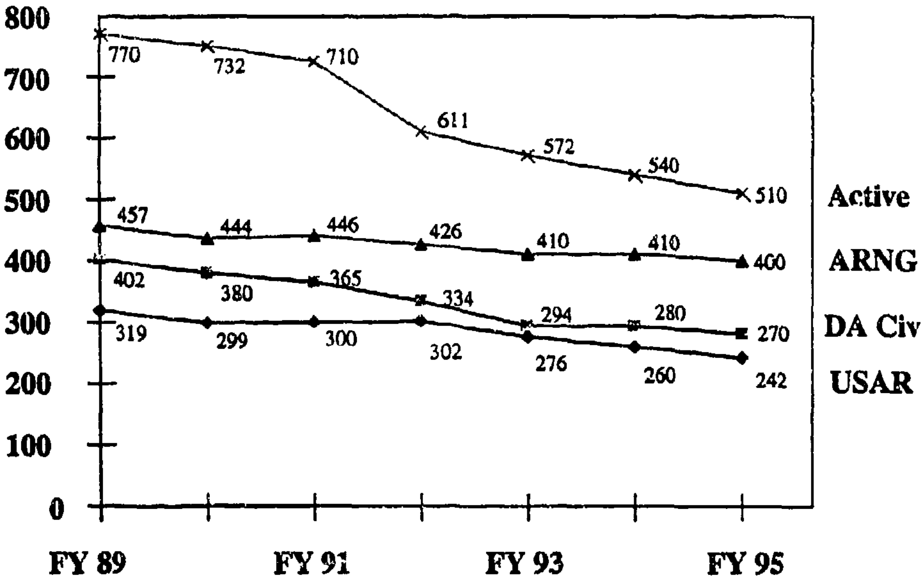


Figure A-7

Summary

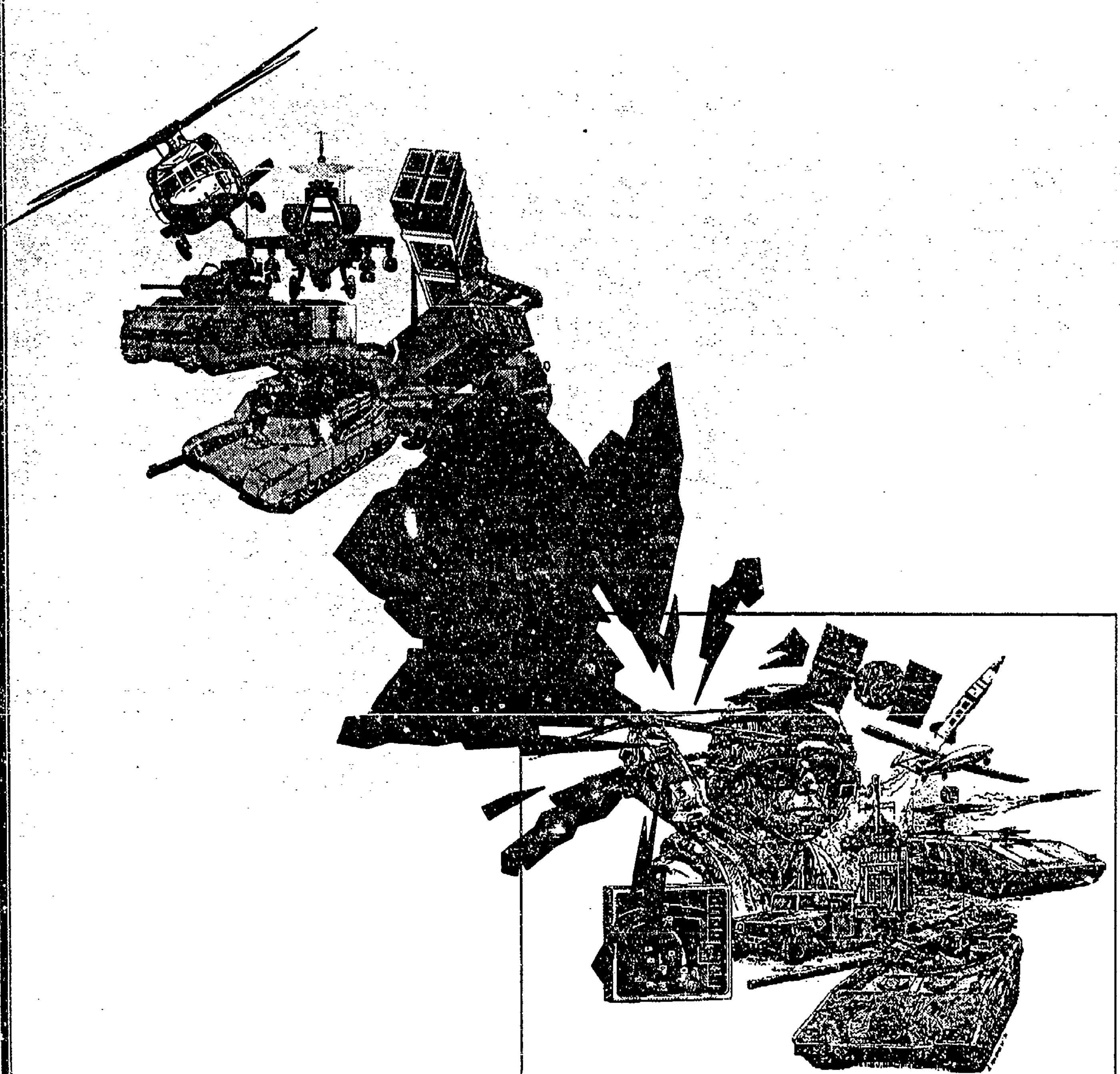
The future U.S. Army force structure is being designed to support the evolving National Military Strategy. As this strategy continues to evolve in the changing paradigm of the post-Cold War era, Army force structure is being modified to support the requirements and new dangers of our changing times. It is often said that we study history so as not to repeat the mistakes of the past; the Army remembers 1950 and earlier years and will make every effort to ensure our Nation's future is secure. To meet these future requirements the Army is developing both the means and the process of achieving success and ensuring its fundamental mission of winning our Nation's wars can be accomplished both quickly and decisively.

The modification to the Army's force structure will be accomplished through the synch onization of the Total Army Analysis process and axes of the Force XXI Campaign Plan. These are more than words and budget rhetoric, but rather demonstrates a maturing process with the intent to ensure America's Army is capable of implementing its portion of the National Military Strategy and meeting those responsibilities in the 21st Century.

"We know what the citizens of the United States expect of us. First and foremost, they expect us to protect and defend the Nation, now and in the future. They expect us to use their resources wisely, to be good stewards of the lands entrusted to our care, and to give their daughters and sons the right training and leadership to accomplish difficult tasks. We will meet those expectations."
HON Togo D. West, Jr. & GEN Gordon R. Sullivan
FY 95 Army Posture Statement

ANNEX B

MOUNTED FORCE



ANNEX B

MOUNTED FORCES

SECTION 1

INTRODUCTION

This Annex addresses the U.S. Army's modernization of its mounted forces. As used here, mounted forces are combat units that participate in and support mechanized operations.

Continued modernization of our mounted forces will ensure victory in the minimum amount of time with minimum loss of life and materiel. As part of the Army's Force XXI, the mounted force is being modernized to enhance capabilities that allow it to be even more operationally/strategically deployable, employable, agile, tailorable, and survivable as part of a joint/multinational force in any future conflict.

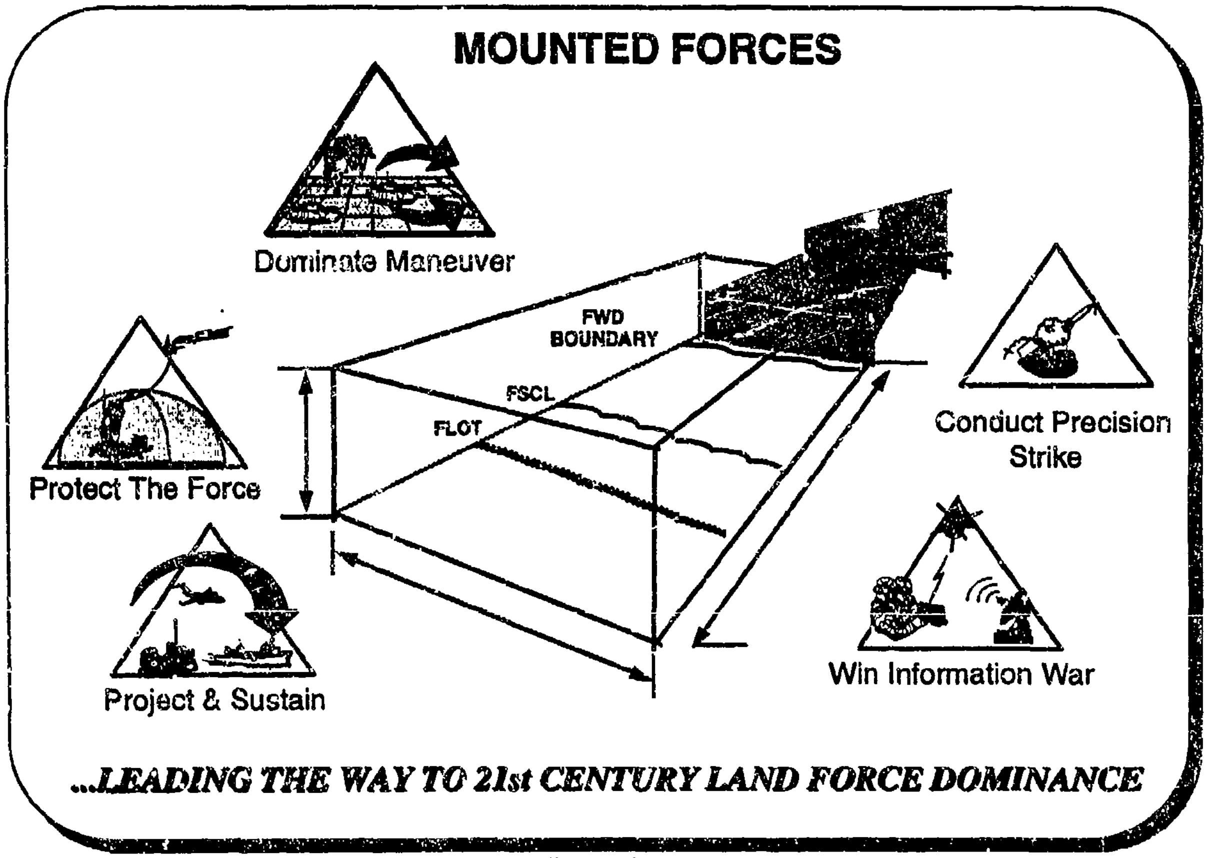


Figure B-1

SECTION 2

WARFIGHTING CONCEPT

MOUNTED WARFIGHTING CONCEPT: *DOMINATE the MANEUVER BATTLE*

The Army's key doctrinal publication, *Army Operations, Field Manual 100-5*, sets the principles of joint operation for the Army, and in so doing complements those found in *Joint Publication 3-0, Doctrine for Joint Operations.* Both Army and joint doctrine envision that future battles will be characterized by high operational tempo, simultaneous operations against a full array of enemy capabilities, and operations in great depth. To succeed, our forces have to dominate the battle space.

Both of the most likely Major Regional Conflicts (MRC) highlighted in the U.S. National Military Strategy require mounted forces to ensure success. Within the mounted battle space, dynamic, armored forces are the centerpiece of a highly mobile, lethal, and survivable force. Armored forces are the only forces that physically control the ground battle space and defeat the enemy in high tempo mobile operations. Air campaigns cannot accomplish this task. In Southwest Asia, weeks of uncontested bombing did not succeed, but 100 hours of ground combat did. Mobile, survivable mounted forces can bring decisive victory.

CSA GUIDANCE

- **MOVE INTO THE 21st CENTURY**
- **DECISIVE VICTORY IS THE NEW STANDARD**
- **DECISIVE VICTORY MEANS OVERWHELMING THE ENEMY, WINNING QUICKLY, SUSTAINING MINIMUM LOSS OF LIFE AND MATERIEL**
- **DIGITIZE THE BATTLEFIELD**
- **CREATE FORCE XXI**

Figure B-2

Battle space is the breadth, depth, and height within which the commander positions and moves his assets over time. Battle space is based on the notion that commanders expand their thinking to develop a vision for dominating the enemy and protecting the force. Mounted battle space relies on the other battlefield dynamics with all pieces combined to make a whole. Forces operating in mounted battle space include armored and aviation forces. These forces are organized into combined arms task forces with combat, combat support and combat service support capabilities tailored for specific combat or Operations Other Than War (OOTW).

To achieve quick, decisive victory, mounted forces must be capable of controlling and dominating the battle. The Nation demands high standards--quick victory with minimal loss of life. These standards require the application of overwhelming combat power that completely dominates any potential adversary. The current generation of armored vehicles--teamed with Paladin, Bradley Fighting Vehicle Fire Support, and Stingers under Armor--are the most survivable and potent combat systems in the Army's arsenal.

Mounted forces are also capable of getting to battle quickly. Power projection figures prominently, therefore, in the Mounted Force Modernization Strategy. The fighting force must be able to get to the fight--no matter where it is--and get there early. Mounted forces are well-suited for early entry use. At this juncture in battle, forces which can maneuver and are lethal, quickly dictate and control battle space and can lead to rapid, decisive victory. Prepositioning afloat and **Prepositioned Overseas Materiel Configured to Unit Sets (POMCUS)** increase the deployability and mobility of mounted forces. Likewise, modern air and sealift capabilities dramatically increase the mobility and contribute to rapid projection of mounted forces.

Moreover, in all future operations, mounted force options will include mounted and dismounted operations with combat aviation assets, each having unique capabilities and characteristics. Such a force provides the Nation with an extraordinary variety of options for future military operations. Both mounted and dismounted Forces play vital roles in every level of conflict--from OOTW to high intensity. Finally, while mounted forces are inherently tailorable, lethal, survivable, agile, dependable, versatile, have all weather capabilities, staying power, and strategic mobility, the Army is at the brink of adding new technologies which enable mounted forces to acquire and attack enemy targets at ever greater distances. By striking the enemy simultaneously with lethal long-range fires, concurrent with rapid combined arms maneuver, the enemy's ability to concentrate and react to our moves is greatly reduced. Mounted forces provide the Nation with the capability to conduct deep, simultaneous attacks, which is key to quick, decisive victory at minimum cost. To ensure our mounted forces maintain the edge in their combat superiority, we must leverage technology within five critical areas:

- Increase lethality. Amplify situational awareness and target handoff within combined arms task forces to reduce fratricide and maximize combat power.

- Increase target acquisition. Increase all weather, day/night target acquisition and Probability of Kill (PK) capabilities.

- Increase survivability. Optimize survivability via: countermeasures (such as reduced signature technology), use of new materials, safety enhancements, and leadership training.

- Digitize the battlefield. Provide commanders with the capabilities to acquire and analyze critical information, and to integrate, synchronize, and employ all warfighting systems to their maximum limits.

- Improve force structure. Determine optimum force design for mounted forces of the future. Smaller units mean a more favorable leader-to-led ratio. More capable units mean greater reconnaissance and security capabilities.

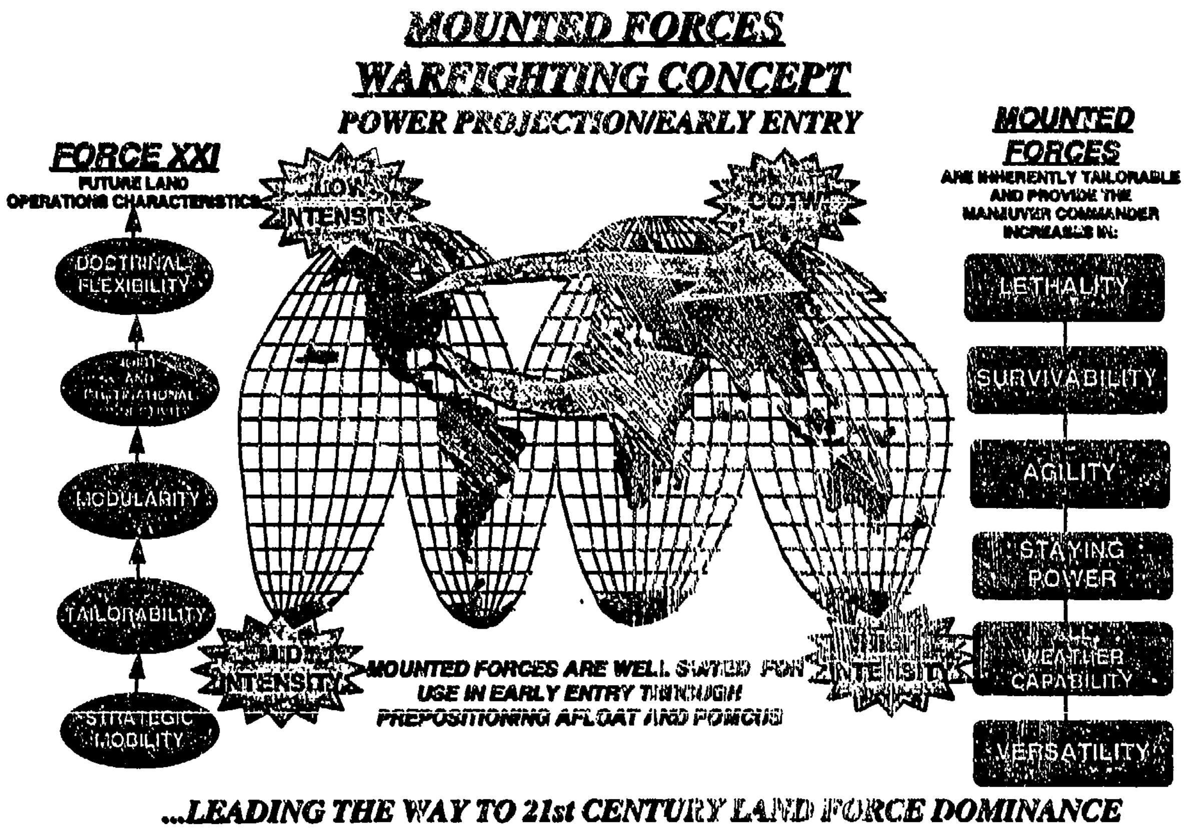


Figure B-3

SECTION 3

CURRENT PROGRAM ASSESSMENT

The Army's current mounted force modernization programs are explained and assessed in terms of their importance to and impact on, supporting mounted force warfighting concepts. Figure B-4 lists those improvements that support the warfighting concepts discussed in Section 2. This section addresses programs that are in the Tech Base, Research and Development, and Procurement phases. Each program will be given a **RED, AMBER**, or **GREEN** rating.

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and,

GREEN -- Adequate capability and quantity exists to perform the mission.

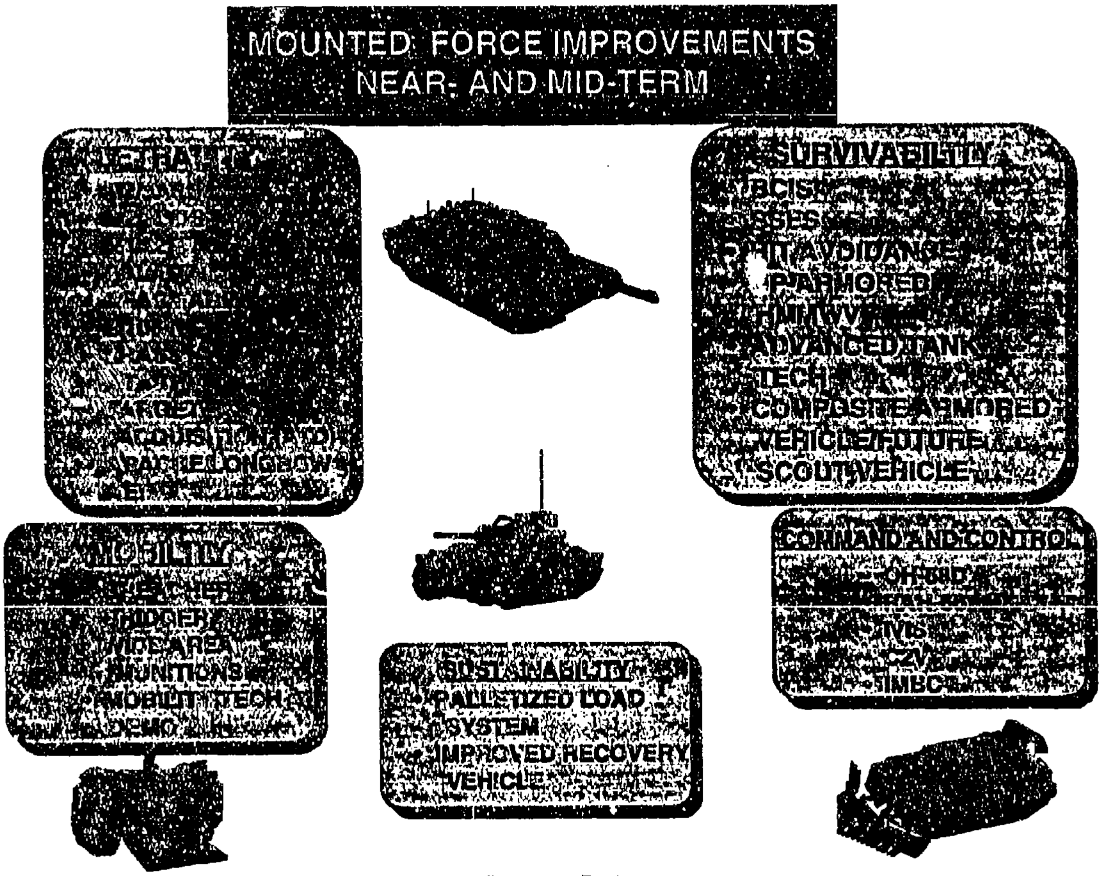


Figure B-4

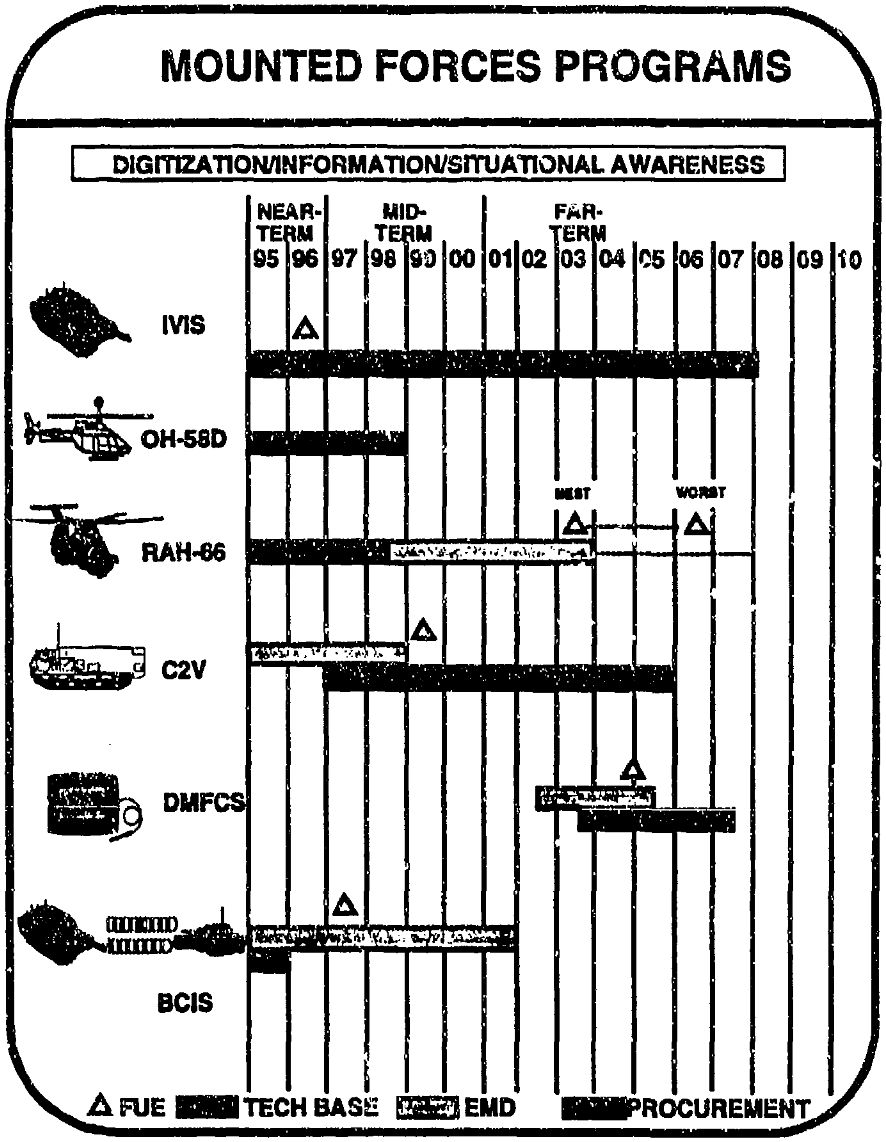


Figure B-5

Digitization/Information/Situational Awareness

The digitized battlefield is the cornerstone of the Army's Horizontal Technology Integration (HTI) initiative. It will add digital, Information Age technology to maneuver elements, which will increase their warfighting capability by enhancing their lethality, survivability, and tempo of operations. The fully digitized combined arms team -- the maneuver, aviation, artillery, engineer and air defense forces, plus the logistical support elements-- will then be able to have a real time, simultaneous, and common picture of the battlefield. Digitization allows combat systems to integrate information among leaders, crews, and combat vehicles creating a real time, simultaneous common picture of the battlefield. Such integration of combat, combat support, and combat service support information will permit maneuver commanders to mass and synchronize their combat forces at critical times and places needed to win battles with minimal casualties.

The digital battlefield is the future of modern warfare. Figure B-5 illustrates the various systems involved to digitize the battlefield.

Intervehicular Information System (IVIS). IVIS provides vehicle heading, position location in 8 digit grid coordinates, grid map surrounding current location, operational messages, and graphics. IVIS is currently in the M1A2 and similar, yet more capable, digitized C2 systems will be embedded in the M2/3A3 Bradley Fighting Vehicle. These embedded systems have the capability to talk to other digitized systems and higher echelon C2 systems. M1A2 IVIS software and hardware will be upgraded to host Force XXI Battle Command Brigade and Below (FBCB2) software in the future. This program, called the System Enhancement Program (SEP), will upgrade the processor, memory, display, and storage in the M1A2 to ensure interoperability and connectivity well into the 21st Century. **The Army is funding 1,079 M1A2 tanks and 1,602 M2/3A3 Bradleys with embedded digitized C2.** Current funding buys 2,681 of the 13,654 systems required. First Unit Equipped for M1A2 is FY 96 and FY 00 for M2/3A3; **AMBER.**

Kiowa Warrior (OH-58D). OH-58D is a single engine armed reconnaissance/security aircraft. It possesses a mast-mounted sight day/night/adverse weather optics. The OH-58 has embedded digitization that detects and identifies targets and can digitally handoff targets to other platforms for precision strikes using Hellfire missiles or other ordnance. **Current POM funds only 383 helicopters of a required 507; AMBER.**

Comanche (RAH-66). RAH-66 is a dual engine armed, low observable reconnaissance/light attack aircraft. It is intended to replace the Kiowa Warrior. Comanche is equipped with the Longbow Radar/Second Generation Forward Looking Infrared (FLIR), advanced avionics, enhanced supportability, and precision fire control and weapons. It is self-deployable to a range of 1,260 nautical miles. RAH-66 has aided target recognition and classification and embedded digital capability, giving the maneuver commander a common picture of the battlefield; **RED.**

Command and Control Vehicle (C2V). The C2V program overcomes command, control, and mobility issues related to the M577. Primarily, the M577 Carrier Command Post cannot keep pace with the Abrams Main Battle Tank (M1A2) or the Bradley Fighting Vehicle, and it lacks C2 capabilities needed to control forces during dynamic operations. 444 C2Vs will be fielded with an First Unit Equipped scheduled for FY 99. **Vehicles will be fielded to Force Packages 1/2/3 (Heavy Units) Corps and below. The total Army requirement for the C2V is 831 vehicles to field all force packages; AMBER.**

Digitized Mortar Fire Control System (DMFCS). The DMFCS integrates mortar platoons, sections, and gun squads with the Army's digital battlefield. Additionally, the DMFCS allows mortars to widely disperse and operate in a semiautonomous manner, which greatly increases their survivability. Key components of the DMFCS include a computer with embedded GPS, a direction determining device with a collimator, and a

dedicated SINCGARS. Mortar units with DMFCS can deliver more accurate fires at twice the rate of present-day units. Although current technology exists to develop and field the DMFCS by FY 98, **funding is not available until FY 02; RED.**

Battlefield Combat Identification System (BCIS). BCIS is the near-term point of engagement (ground to ground) combat Identification (ID) system designed to reduce fratricide and enhance force effectiveness. It is a fully digitized millimeter wave (MMW) Question & Answer (Q&A) system to provide positive friendly ID. **It is only funded for 45 Engineering, Manufacturing, and Design prototypes and 160 Low Rate Initial Production systems; AMBER.**

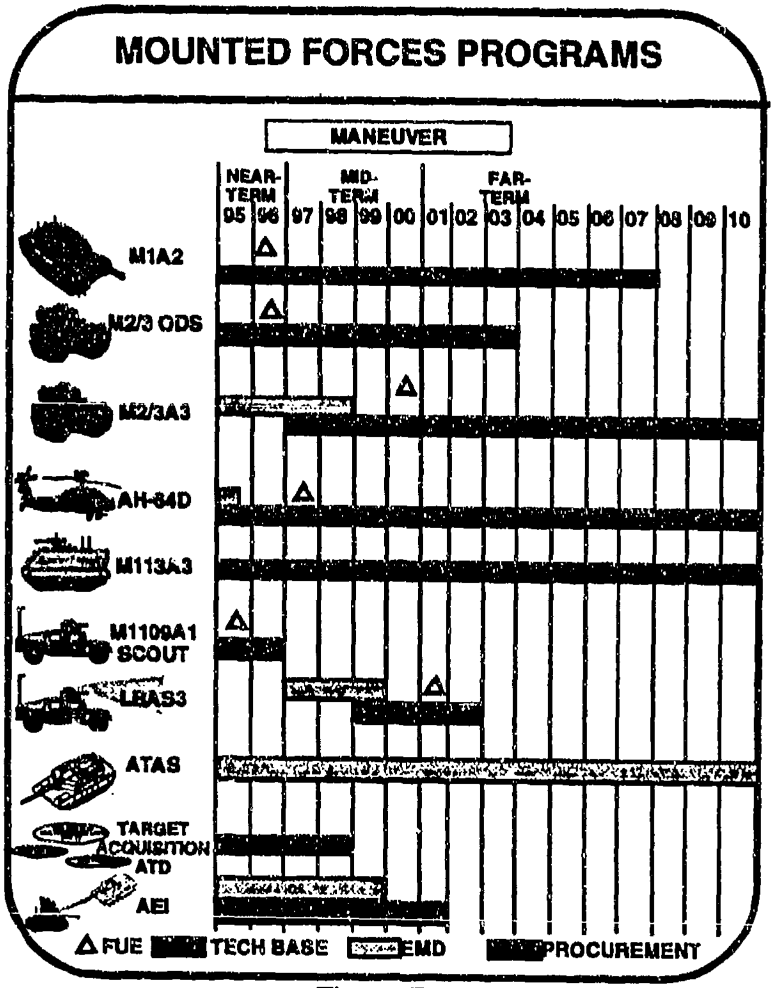


Figure B-6

Maneuver

Maneuver is movement relative to an enemy, which puts him at a disadvantage. Maneuver and firepower create conditions to hinder or destroy an enemy by direct application of lethal combined arms fires.

Abrams Main Battle Tank (M1A2). The M1A2 is a key component of the Army's strategy to digitize the battlefield, to "own the night" via Second Generation Forward Looking Infrared (FLIR) and to increase effectiveness through horizontal technology insertion. Improvements (over the M1A1) include the Commander's Independent Thermal Viewer (CITV), the Position Navigation System (POS/NAV), improved armor, Improved Commander's Weapon Station, Second Generation FLIR, and the Intervehicular Information System (IVIS). Self-cleaning air filters and Eyesafe Laser Range Finder (ELRF), are some of the improvements that will be added to the M1A2 production line in the future. Abrams upgrade program consists of two phases:

- **Phase I (FY 91-FY 95) procures 81 M1A2 vehicles (including four pilots) and 206 upgrades and partially fields one division of the CONUS Contingency Force (CCF); and,**

- **Phase II (FY 96-completion) provides 792 M1A2 tanks and is funded for 70 upgrades per year--this completes the CONUS Contingency Force and a portion of the Forward Deployed Divisions in FY 07; AMBER.**

Bradley Fighting Vehicle Upgrade (M2/3 ODS). The ODS Bradley upgrade possesses several important advantages that present a wise and objective balance between near-and far-term modernization of the Bradley Fleet without incurring undue risk. Until the A3 Bradley with embedded digitization is fielded in FY 00, the Army must maintain its technological overmatch on the battlefield. Improvements over M2/3A1 include an Appliqued Digitization capability, ELRF, GPS/Position Navigation System (POS/NAV), Driver's Thermal Viewer (DTV), Restowage, Battlefield Combat Identification System (BCIS) and Missile Countermeasure Device. **ODS Bradley will initially go to Force Package 1 in FY 96 and completes Force Package 3 active component units in FY 03; AMBER.**

Bradley Fighting Vehicle Upgrade (M2/3A3). The Bradley A3 program permits the Army to maintain task force compatibility with the M1A2 and achieve technology overmatch on the digitized battlefield. In addition to all the improvements listed under the ODS Bradley, the A3 Bradley will gain significant lethality by increasing target acquisition and recognition capabilities to the full range of the onboard weapon system through a Second Generation FLIR. Procurement funding begins in FY 97 with First Unit Equipped in FY 00. **The total program procures 1,602 A3 Bradley upgrades for the CONUS Contingency Corps, Afloat, and Training Base; AMBER.**

Bradley Fighting Vehicle Upgrades (M2/3 ODS and M2/3A3). When M2/3A3 Bradley's begin to be fielded in FY 00, M2/3 ODS will be cascaded down to Force Packages 2 and 3. At end state the Force Package 3 enhanced brigades will be equipped with the M2/3 A2 vehicles. Force Package 4 National Guard units will be equipped with the remaining M2/3 Bradleys. The total Bradley Fleet at end state will be 6720 vehicles. The total Army requirement for Bradley Fighting Vehicles for all force packages will be 6994--thus, a shortfall of 274 vehicles.

Apache Longbow (AH-64D). AH-64D is a product improvement over the AH-64A. The Longbow package improves the Apache's adverse weather precision strike capability; rapid target detection, classification and prioritization; enemy air defense suppression capability; and its battlefield survivability. Current funding provides 758 AH-64Ds, 227 of these equipped with Fire Control Radar (FCR). First Unit Equipped FY 97, Contingency Corps will be complete for Active Army Units by FY 04. The National Guard and Army Reserve Contingency Corps Battalions will be fielded by FY 06. **The Army's total requirement to field all force packages is 987; AMBER.**

M113 Family of Vehicles (FOV) Upgrade Program (M113A3). The Reliability Improvement Selected Equipment (RISE) program was designed to improve the mobility and survivability of the M113A2 Armored Personnel Carrier. Improvements include: a 275 horsepower engine and an improved transmission; externally mounted fuel tanks; and improved steering mechanism. The Army intends to apply a RISE power upgrade to the remaining vehicles in Force Packages 1 and 2. **The total Army requirement for M113A3 in all force packages is 17,353; AMBER.**

Scout Up-Armored HMMWV (M1109A1). Up-Armored HMMWV increases Scout survivability by upgrading protection levels throughout the vehicle. It provides the crew with 360 degree 7.62 AP protection and up to 12 pound underbody mine protection, while maintaining the mobility of the current Scout HMMWV (M1025/M1026). Production is scheduled to begin in FY 95 with First Unit Equipped in FY 95. **Current funding procures 390 vehicles. POM 96-01 requests an additional 494 scout variants which does not complete all Active Component scout platoons. The total requirement for the Scout Up-Armored HMMWV is 1,358 vehicles for all force packages; AMBER.**

Long Range Advanced Scout Surveillance System. LRAS3 is a mounted and man-portable, day/night, adverse weather observation and target acquisition device. This device allows Scouts to acquire and identify enemy equipment and positions while remaining outside of direct fire acquisition and engagement ranges. LRAS3 will have a 50-70% better target acquisition capability over current systems. **Procurement is set to begin in FY 98 with a First Unit Equipped in FY 01. The Army intends to purchase 650 systems which will fill all Force Package 1 heavy battalion scout platoons and the light armored cavalry regiment. The total Army requirement for LRAS3 is 1,358 systems for all force packages; RED.**

Advanced Tank Armament System (ATAS). The ATAS program is the foundation for the next generation of tank improvements. ATAS is a synergistic approach to armament system improvement. It integrates component developments to achieve increased SEE, HIT, and KILL capabilities. The ATAS development program has two ATDs that seek to maximize capabilities in gun, ammunition, autoloader, and fire control technologies. ATD I incorporates five Technology Demonstrations Items (TDIs): M1 Thermal Gunner's Sight (TGS), Commander's Second Generation Tank Sight (CSGTS) with integrated laser designator, hunter/killer capability, 120mm XM291 gun, auto boresight and auto tracker. Demonstration will occur in FY 00. ATD II

incorporates improved fire-on-the-move capability, autoloader, and 360 degree sight/autotracker/hunter killer configuration. Demonstration will occur in FY 01. **POM funds two Advanced Technical Demonstrations; RED.**

Target Acquisition Advanced Technology Demonstration (ATD). Target Acquisition is a Science and Technology (S&T) Base ATD program. It provides mounted forces with a long-range FLIR/sensor suite with aided target acquisition and rapid search. The aided target acquisition and prioritization at extended ranges allow reduced crew workload/timelines in support of lethal, deployable combat vehicles with smaller crews. **Target Acquisition Advanced Technology Demonstration is approved for an ATD FY 95-98; GREEN.**

Armament Enhancement Initiative (AEI). AEI is a comprehensive program to accelerate fielding of tank ammunition and ensure the continued lethality of the U.S. tank fleet (in view of the rapid and worldwide development of armored vehicle protection technology). Current developments are in the areas of kinetic energy, guided kinetic energy, and smart top attack rounds. To date five rounds of ammunition have been incorporated into this initiative (M900, 105mm Armored Piercing Fin Stabilized Discarding Sabot-Tracer (APFSDS-T); M829A1, 120mm APFSDS-T; M829A2, 120mm APFSDS-T; M830A1, 120mm HEAT-Multipurpose (MP)-T; and the XM943, 120mm Smart Target Acquisition Fire and Forget (STAFF). The M900 and M829A1 are currently completing production, while the M829A2 and M830A1 are in production, and the STAFF round is in development. **STAFF is fully funded in the POM through EMD but has no production funds; AMBER.**

FIREPOWER - Indirect Fire Support

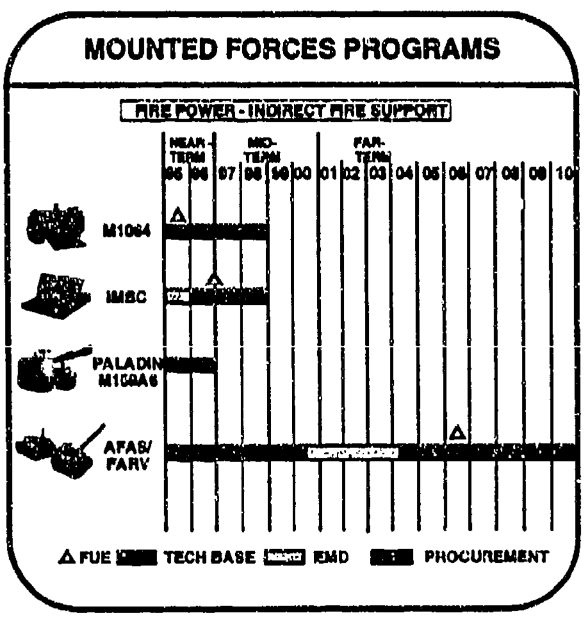


Figure B-7

Indirect Fire Support is integral to mounted force operations; it is crucial to success on the nonlinear battlefield. Indirect fire support consists of mortar, cannon, rocket, and missile systems. Indirect fire can neutralize, suppress, or destroy enemy direct fire forces; attack enemy artillery and mortars; and deliver scatterable mines to shape the battlefield, isolate and interdict enemy forces, and protect friendly operations.

M1064 Carrier with M121 120mm Mortar System. The M121 is a smooth bore, muzzle loaded mortar system. The M121 Carrier Mounted Mortar replaces the 4.2" mortar on a one for one basis in mechanized infantry battalions, armor battalions, and cavalry squadrons. The maximum/minimum ranges of the 120mm mortar is 7,200/200 meters (compared to 6,800/800 meter of the 4.2" mortar). The M121 is mounted in the M1064 carrier, a modified 4.2" mortar carrier. **Fielding of the 120mm mortar mounted in the M1064 begins in FY 96. Force Packages 1 and 2 will receive RISE upgraded M1064A3 carriers. The total Army requirement for all force packages is 1,260 systems. First Unit Equipped is FY 96; AMBER.**

Improved Mortar Ballistic Computer (IMBC). IMBC replaces the current M23 Mortar Ballistic Computer. The IMBC provides digital message capability and integrated mortar firing data which are compatible with modern automated field artillery fire control systems. The IMBC has an embedded GPS. **Procurement begins in FY 96, but there is insufficient funding to procure more than 489 of the required 1,387 systems; AMBER.**

Paladin (M109A6) - The M109A6 is a product improved M109A2/3 Howitzer that provides increased range, survivability, and responsiveness to support maneuver forces of mounted divisions/brigades with indirect fire support. Improvements include onboard ballistic computer (allows semiautonomous operations); onboard position/navigation (allows "shoot and scoot" tactics); and better crew survivability through improved ballistic protection, fire reduction, and micro NBC. **Full rate production was awarded with total procurement of 824 Paladins. The Total Army requirement for 155mm Howitzer systems, to all force packages, is 2,500; AMBER.**

Advance Field Artillery System/Future Armored Resupply Vehicle (AFAS/FARV). AFAS and FARV employ high payoff, leap ahead technologies in support of the Army's objective to Dominate the Maneuver battlefield and Protect the Force. AFAS improves the range of 155mm cannon artillery to 40 kilometers unassisted and 50 kilometers with rocket assisted. It increases the current maximum rate of fire from four rounds per minute to 10-12 rounds per minute and sustained rate of fire from 1 round per minute to 4-6 rounds per minute. The mobility of AFAS/FARV means this system can keep pace with M1 and M2/3 maneuver forces. Its rate of movement increases from 30 kilometers per hour (kph) to 48 kph. AFAS/FARV is a one for one replacement of Paladin and is **expected to begin fielding in FY 05. AFAS/FARV is currently funded for 824 systems. The total Army requirement to field Paladin and AFAS/FARV (155mm Howitzer systems), to all force packages, is 2,500; AMBER.**

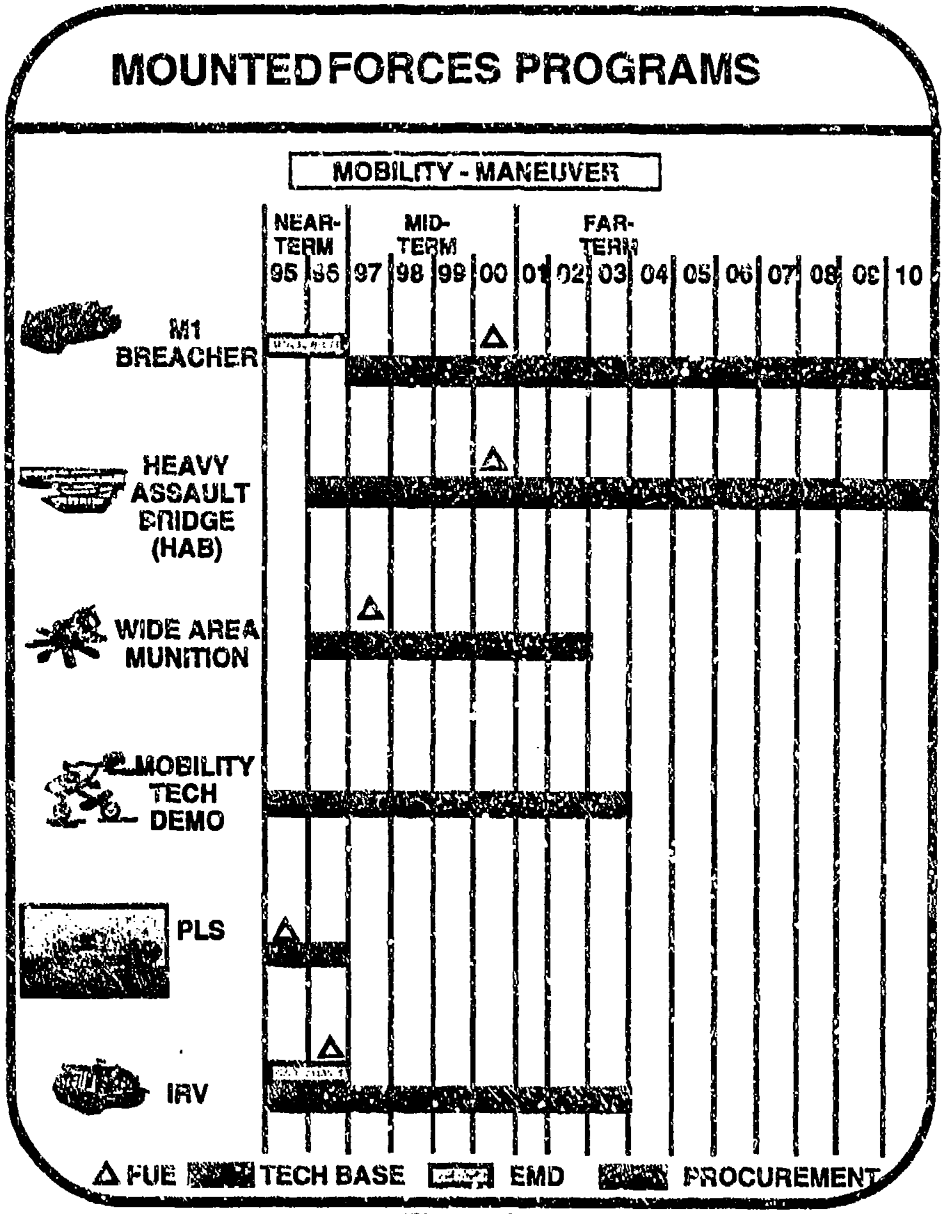


Figure B-8

Mounted forces must preserve the freedom to maneuver. At the same time they must deny mobility to enemy forces. Mounted forces can then employ fire and maneuver to destroy enemy forces.

M1 Breacher. The M1 Breacher provides maneuver commanders with the capability to breach complex obstacles in-stride and under fire. It has mobility, agility, and sustainability comparable to the Abrams tank, and can clear a four meter wide path through any mined obstacle. M1 Breacher is equipped with a data bus to support future

digitization upgrades. **Current funding fields the M1 Breacher through Force Package 1 and 2. The Army requirement for the M1 Breacher to field all force packages is 1,136 units. First Unit Equipped is scheduled for FY 00; AMBER.**

Heavy Assault Bridge (HAB). The HAB is mounted on a Abrams chassis and supports mounted forces. It too has mobility, agility, and sustainability comparable to the Abrams tank and can span a 24 meter gap with a 70 ton load limit portable bridge. The HAB can launch its bridge within five minutes and retrieve the bridge within ten minutes. **Current funding fields Force Packages 1 and 2 with First Unit Equipped in FY 00. The Army requirement for the HAB to field all force packages is 1,159; AMBER.**

Wide Area Munitions (WAM). The WAM is a smart munition that revolutionizes mine warfare. It acoustically and seismically tracks and attacks tanks within 100 meters. It fires an explosively formed penetrator through the top of the tank. **Current funding procures WAM through the majority of Force Package 1 units with a First Unit Equipped of FY 97. The Army requirement for WAM to field all force packages is 3,300; RED.**

Mobility Technology Demonstration. The Mobility Technology Demonstration (TD) demonstrates advanced mobility subsystems including electric drive/hybrid electric drive, active/semiactive suspension and lightweight track. The mobility technology demonstration is a S&T-based TD which provides mounted forces with highly agile and power efficient mobility systems for land combat vehicles. **MTD is an ongoing ATD that began in FY 94 and runs through FY 00; GREEN.**

Palletized Load System (PLS). The PLS is a 16.5 ton vehicle composed of a prime mover with integrated self-load/unload capability, a 16.5 ton trailer, and demountable cargo beds called flatracks. The PLS is issued to forward support battalions in the heavy forces. It reduces the requirement for materiel handling equipment, personnel, and trucks. First Unit Equipped occurred in FY 94. **Production funding ends in FY 95 and does not complete all of Force Package 4; AMBER.**

Improved Recovery Vehicle (M88A1E1). The IRV is a 70 ton recovery vehicle and is the only vehicle capable of recovering a Abrams tank. The IRV can also lift 35 Tons. **The current Army Acquisition Objective (AAO) of 346 vehicles fills Force Packages 1 and 2 and the training base; First Unit Equipped is scheduled for 1Q FY 97. The total requirement for the IRV is 961 vehicles to field to all force packages. Current funding does not procure any vehicles for FP 2; RED.**

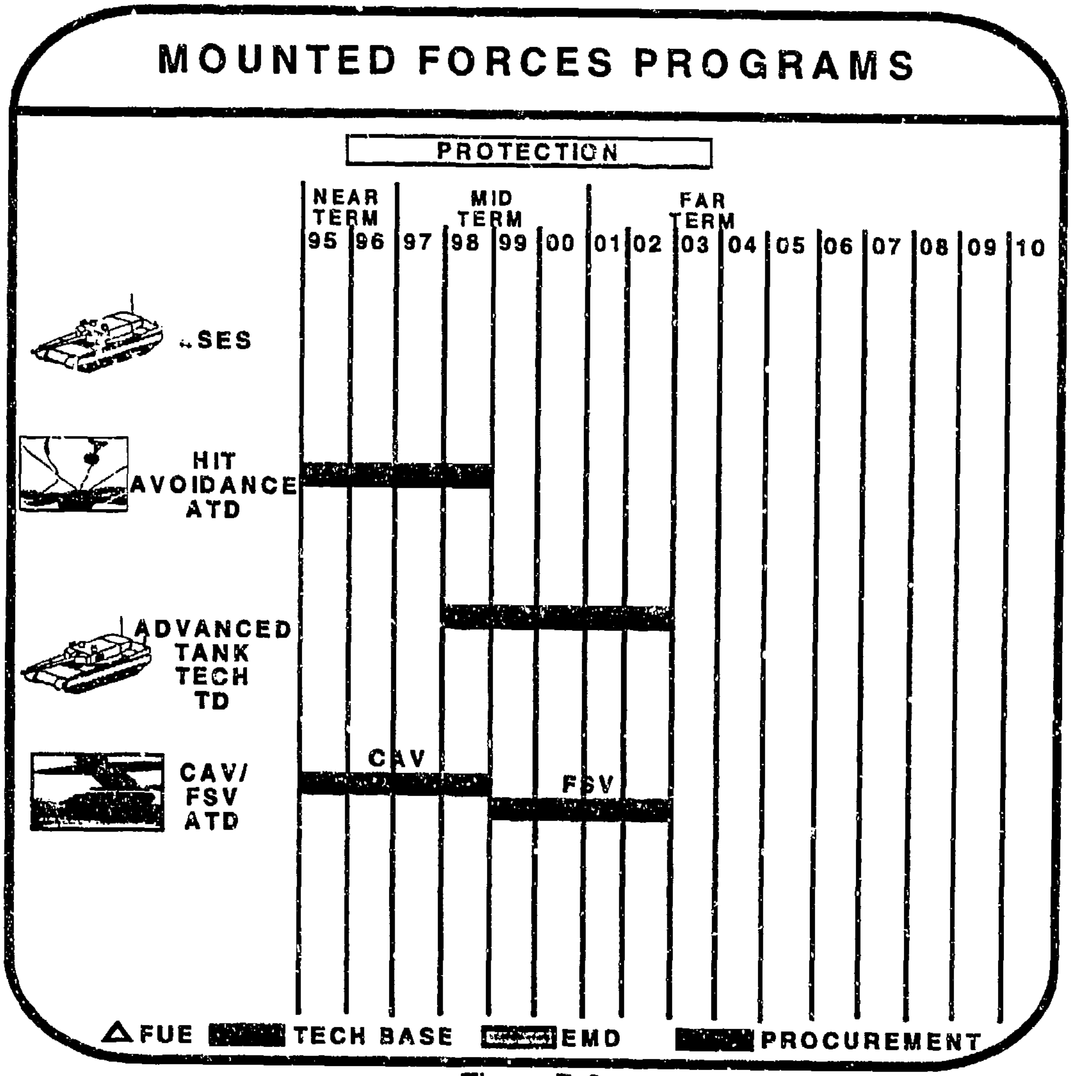


Figure B-9

Protection

Soldiers continue to be our most valuable battlefield asset. Greater emphasis must be placed on reducing the susceptibility and vulnerability of personnel and armored vehicles to enemy attack. Through the use of new sensor, countermeasure, and lightweight composite armor technologies, we can increase operational effectiveness and, at the same time, reduce the likelihood of mounted force casualties.

Suite of Survivability Enhancement Sensors (SSES). SSES is a group of new countermeasure and sensor technologies that reduce the detection and increase the survivability of armored vehicles. **SSES is not funded for development or procurement; RED.**

Hit Avoidance. This ATD demonstrates integrated hit avoidance technology. It offers mounted forces lightweight protection. The technologies include threat sensors, countermeasures, and active defensive measures. Hit avoidance technologies closely parallel the Suite of Survivability Enhanced Sensors. **ATD is scheduled to begin in FY 95; GREEN.**

Advanced Tank Technology. Advanced Tank Technologies provide the Mounted Force a survivable, lethal, and more deployable tank. Advanced Tank Technologies, demonstrated on a surrogate chassis, include integrated aided target acquisition and hit avoidance with reduced crew operation. **The Advance Tank Technology ATD is scheduled to begin in FY 98; GREEN.**

Upgrade (Tank 1080). The Army is considering at least one more upgrade to the tank. Called Tank 1080, produced upon completion of the M1A2 Upgrade Program, it extends the capabilities of the Abrams well into the next century. The upgrade provides the armored force with the lethality needed to defeat advanced armor at extended ranges and provides the survivability to defeat advanced precision guided munitions.

Armored Gun System (AGS). The AGS is a lightly armored, direct fire weapon system to replace the obsolete M551 Sheridan. The AGS is the Army's first large caliber, direct fire combat vehicle with a three man crew and a main gun autoloader. It is transportable in, and capable of low velocity drop from C-130 aircraft. AGS goes to the XVIII Airborne Corps and the 2d Armored Cavalry Regiment. Early user testing begins in FY 95 with procurement funding beginning in FY 96. The total Army requirement for the AGS is 237 vehicles to field all units designated for the AGS; **GREEN.**

Composite Armored Vehicle (CAV). CAV is a S&T base ATD. It provides the mounted force with a lightweight ground vehicle that uses advanced composites with integrated signature management technologies. The CAV ATD begins in FY 94 and proceeds to FY 98. CAV has the potential to spawn several future combat vehicles.

Future Scout Vehicle (FSV). FSV is a S&T base ATD. The FSV is a follow-on to the CAV because the FSV uses the technologies developed in the CAV to develop the Army's first dedicated scout/reconnaissance vehicle. The FSV tech demo is scheduled for FY 99. **FSV is funded for development beginning in FY 05. FSV capability is needed in the near-term and funding is not available; RED.**

Assessment of Mounted Force Modernization

Overall, the Mounted Force modernization program is **AMBER**. Mounted Force modernization continues to improve throughout the near-, mid-, and far-terms. Reduced funding, development, and procurement of several important systems have been postponed, stretched out, and/or reduced in quantity. This equates to a fully modernized Contingency Corps and the cascading of their equipment to modernize the rest of Force Packages 2, 3 and 4. This creates major differences in the levels of

modernization within the various force packages. The introduction of the M1A2 and M2/3A3 improves survivability, lethality, and situational awareness through faster access to intelligence, enhanced decision-making, and improved dissemination of orders and graphics. However, the shortfall in mounted force modernization continues in the reconnaissance (Scout) capabilities. The optimum scout vehicle has not yet been designed, although the Up-Armored HMMWV is an interim solution that meets the Scout's minimum requirements. The LRAS3 is the essential improvement that will make the Scout Up-Armored HMMWV an effective interim solution. Without improvements our current Scout Vehicle is inadequate and will remain so until the Future Scout Vehicle is fielded.

Figure B-10 assesses mounted force programs compared to the warfighting concepts of this Section over a near-, mid-, and far-term.

MOUNTED FORCE PROGRAM ASSESSMENT

	FORCE XXI WARFIGHTING CONCEPTS	NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
DIGITIZATION INFORMATION	•Force XXI •Common picture of battlefield sensor to shooter. •Situational Awareness	AMBER	AMBER	AMBER
FIREPOWER	•Improved Lethality •Extended Battle space •Enhanced timeliness, synchronization and accuracy of direct/indirect fires •Reduced decision cycle.	AMBER	AMBER	AMBER
MOBILITY MANEUVER	•Increased agility •Integrated CS/CSS •Enhanced man-machine interfaces	RED	AMBER	AMBER
PROTECTION	•Improved Combat ID and fratricide avoidance •Faster Maneuver providing less exposure. •FLIR provides improved recon capability	RED	AMBER	AMBER

Figure B-10

Figure B-11 shows our assessment of mounted force capabilities and systems as they apply to armor and mechanized infantry, cavalry/scout elements, mobility/ countermobility and survivability, indirect fires, and munitions. Figure B-12 summarizes each system's shortfall.

MOUNTED FORCE PROGRAM ASSESSMENT

Objectives	Deficiencies	Near-Term (FY 95-96)	Mid-Term (FY 97-00)	Far-Term (FY 01-09)
Project and Sustain the Force	-Deploy external support -Logistics distribution -Load carrying (2 1/2 ton and 5 Ton Vehicle Fleet outdated)	AMBER	AMBER	AMBER
Mobility/ Countermobility/ Survivability	-Countermine Red in the near term. -HAB, HDSB, and Breacher Improves mobility in near-term. -Construction Equipment Aging.	RED	AMBER	AMBER
Ground Cavalry and Scout	-No dedicated Recon Platform. -Lack of sensors to perform mission (i.e., LRAS3 FUE 01).	RED	RED	AMBER
Precision Fires	-Outranged - Can't keep up with maneuver. - Inadequate smart munitions. -Inadequate indirect fires	AMBER	AMBER	AMBER
Dominate the Maneuver Battle (Armor/Mechanized Infantry)	-Greater Survivability -Improved Lethality/ Probability of kill at extended ranges. -Slow information transfer	AMBER	AMBER	GREEN
Munitions	-Limited Items Procured (i.e, 120mm ammo) -Limited Quantities Procured -Lack of 105mm& 120mm improvements.	GREEN	RED	RED

Figure B-11

Summary of Systems Shortfalls - What The POM Buys

RED SYSTEMS	
Composite Armored Vehicle/ Future Scout Vehicle	Program will culminate with a Top Level Demonstration in FY 02. FSV RDT&E dollars begin FY 05.
Long-Range Advanced Scout Surveillance	Procures 650 systems which fields Force Package 1.
Advanced Tank Armament System	POM funds for two Advanced Technical Demonstrations. ATD I in FY 00 and ATD II in FY 01.
Improved Recovery Vehicle	Funds 346 IRVs out of a requirement of 961.
Wide Area Munitions	Funded for 5922 WAMs. Completes 93% of Force Package 1 requirements. Does not complete Force Package 4.
Suite of Survivability Enhancement Sensors	Not currently funded in the POM.
Comanche	Funded for two prototypes in Tech Base.
AMBER SYSTEMS	
M1A2	Funded to resource Force Package 1 and 36% of Force Package 2.
M2/3 ODS	Initially fields Force Package 1 units. When M2/3A3 begins fielding in FY 00, ODS will cascade to Force Packages 2 and 3. 10 division active force will be pure fleeted with ODS or A3 Bradleys.
M2/3A3	Funded to field Force Package 1.
AH-64D	Funded for 758 AH-64Ds, 227 of those will have the Fire Control Radar. First unit equipped FY 97, Contingency Corps complete by FY 04 (six battalions Active Components only).
M1 Breacher	POM funds for 382 systems. Fields Force Package 1 and 2 and 16% of Force Package 3.
Heavy Assault Bridge (HAB)	Fields Force Packages 1 and 2 and 4% of Force Package 3.
M1109A1 - Scout Up-Armored HMMWV	Funds procurement of 884 systems to field 93% of the Active Component.
AFAS/FARV	Follow on to Paladin, currently funded for 824 systems (one for one replacement for Paladin in Force Packages 1 and 2).
Intervehicular Information System	Funds Force Package 1 and 36% of Force Package 2.
Kiowa Warrior	Funded for only 383 aircraft out of a requirement of 507.
Command and Control Vehicle	Funded to resource Force Packages 1 through 3 (heavy units) at echelons corps and below.
M113A3	POM funding procures upgrades to complete Force Package 1 and 50% of Force Package 2.
Improved Mortar Ballistic Computer	Funds 489 of the required 1350 systems.
Paladin - M109A6	Funds for 824 of the required 1875 (Force Packages 1 and 2). After fielding of AFAS/FARV, Paladin will cascade down to Force Packages 3 and 4.
Palletized Load System	Does not complete Force Package 4.
GREEN SYSTEMS	
M1064A3	Funds procurement of Force Packages 1 through 3 and 50% of Force Package 4.

Figure B-12

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

The key to successful implementation of the Army Research, Development and Acquisition (RDA) strategy is that of continuous modernization. The goal of RDA is to equip the American soldier with world class equipment, in sufficient quantity and in the shortest possible time, so the American soldier can win quickly, decisively with minimum casualties.

The goal of continuous modernization is to have a major warfighting system (main battle tank, Howitzer, etc.) in production, being upgraded, or a replacement system in development. Continuous modernization sustains our forces, their capabilities, and the entire acquisition system--people, supporting industrial base, infrastructure, and programs.

Given the fiscal constraints imposed on the Defense Department, DoD has adopted a new acquisition approach which emphasizes investment in Science and Technology programs and leads to a range of Advanced Technology Demonstrations.

Five key tenets characterize the new RDA approach:

(1) Maintain a robust and aggressive Science and Technology base, our foundation, because America must maintain technological superiority.

(2) Conduct Advanced Technology Demonstrations of promising new technologies to mitigate technical risks, gain early user suitability assessments, and ensure technologies and associated subsystems plus advanced manufacturing processes are thoroughly demonstrated prior to the Demonstration and Validation Phase.

(3) Focus near-term modernization by inserting advanced technologies into existing systems. This, in turn, maximizes prior investment and offers quick increases to our fielded combat capability. Upgrades are continued until they are no longer cost effective and are determined by the dictates of a credible new threat, the absence of growth potential in current equipment, and the advent of technological opportunities which require development and production of new end items.

(4) Limit Demonstration and Validation programs only to those systems which are resourced and will be produced in the future. New weapon systems are produced only after the threat and the cost effectiveness of producing the system are verified, and technical and manufacturing risks are reduced to acceptable levels. The intent to produce must be attendant to entry into Demonstration/Validation.

(5) Support DoD efforts to maintain a minimally adequate, but responsive, industrial base for critical products to meet potential reconstitution requirements. This industrial base must be managed even as it downsizes to ensure we have the needed future capabilities to develop and produce world class equipment. The base must be rightsized--structured to perform: (a) R&D for life extension via technological infusion; (b) new product R&D; (c) systems integration; (d) production; and (e) life cycle support.

Figure B-13 shows the timeline for the Advanced Technology Demonstrations that effect the Mounted Force Modernization.

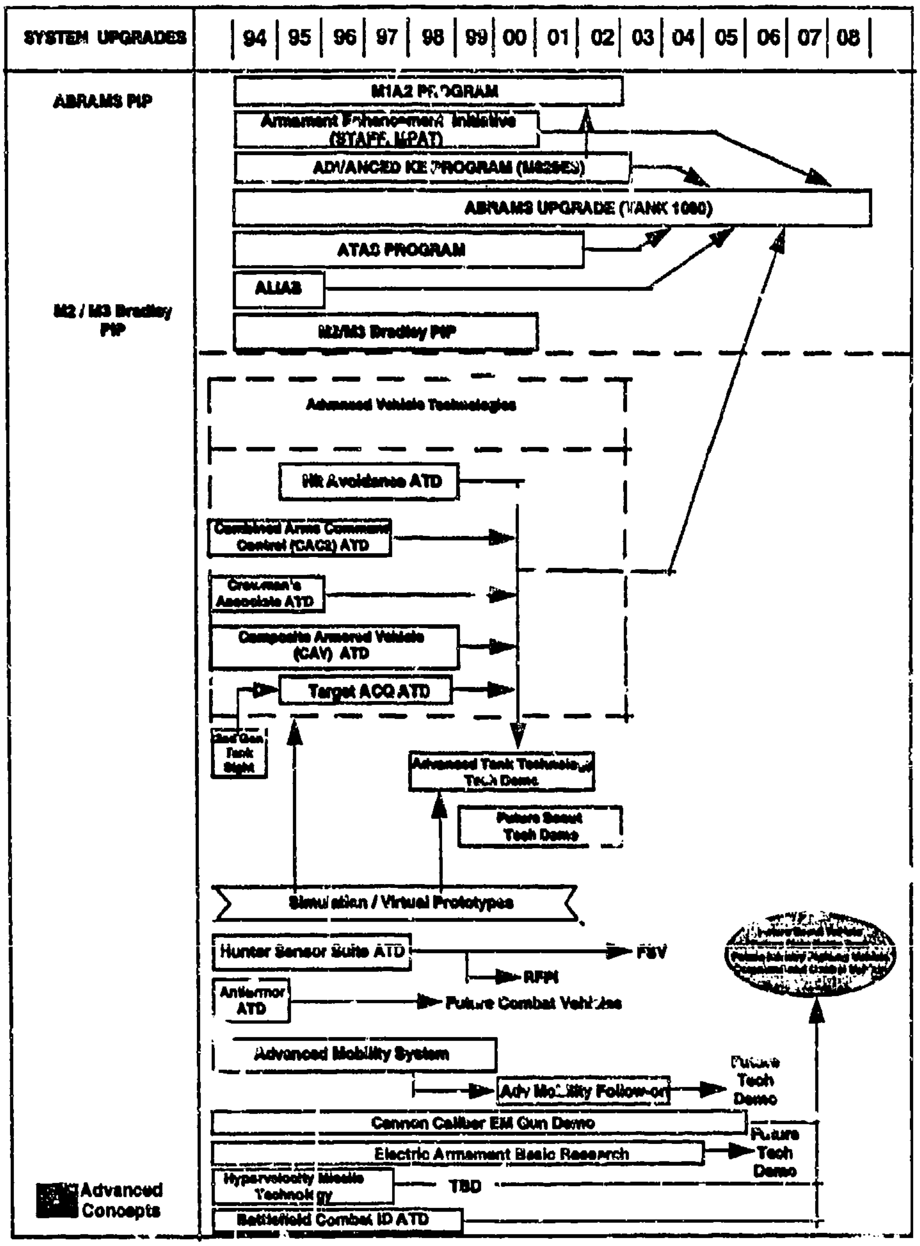


Figure B-13

Science and Technology. S&T activities in the mounted force mission area provide technologies to continually upgrade fielded systems and improve our capabilities to rapidly project force. Technologies under development have multi-system applicability and address lethality, survivability, affordability, crew-machine interface (e.g., workload, fightability, situational awareness), strategic deployability, and tactical mobility. Demonstrations, selected in consultation with users, offer significant improvements over current capabilities or solve existing deficiencies. The potentials of technologies are evaluated by extensive modeling and simulation, advanced warfighting experiments (carried out by TRADOC battle labs), and by demonstrations.

The Way Ahead

The essential aspect of S&T is to identify, prioritize, and develop technologies which have the greatest potential to enhance survivability, lethality, strategic deployability, battlefield mobility, and affordability. Several such technologies are:

Digitization

The digital data/electronic system incorporated in the M1A2 allows improvements in shared situational awareness, fire control, and integrated defensive systems as they become available. The goals of the Combined Arms Command and Control (CAC2) ATD program are to extend capabilities well beyond those provided by IVIS and to link other elements of the force (e.g., fire support, aviation). CAC2 technologies further improve the crew's view of the battlefield and eliminate much of the "smoke and confusion" of battle. The vastly improved coordination of individual and unit operations in battle would give U.S. forces the greatest leap ahead in effectiveness ever experienced by a military force.

Firepower

For the tank a new direct fire lethality initiative explores ways to: (1) improve lethality of kinetic energy penetrators (e.g., M829A3), especially against explosive reactive armor; (2) increase the range and lethality of the 120mm Smart Target Activated Fire and Forget (STAFF) munition to improve its compatibility with advanced target acquisition sensors (e.g., Second Generation FLIR); and, (3) develop the means to defeat active protection systems. Electric armaments continue to be explored, but many technical hurdles remain before such systems can be weaponized. The Target Acquisition ATD demonstrates automated wide area search and target acquisition, prioritization, and tracking at extended ranges. These capabilities can reduce crew workloads, speed acquisition of targets, and more effectively employ direct fire. The hunter/stand-off killer approach applies to mounted forces because this approach relies on forward deployed sensors that are linked to smart, non-line of sight weapons and enhances the lethality and survivability of light forces.

Mobility and Maneuver

Several S&T programs aim to improve the strategic deployability of mounted forces by reducing the size and weight of combat vehicles. To accomplish this, we are exploring: (1) advanced, lightweight, high strength materials (e.g., composites) for vehicle structures; (2) advanced and automated crew stations to permit effective operation with fewer crew members; and (3) advanced target acquisition (see Firepower, above). Further, we are looking at more efficient, higher power density propulsion systems, improved suspension, and lighter track to meet the size, weight, and performance demands of lighter, more deployable, and lower cost ground combat vehicles.

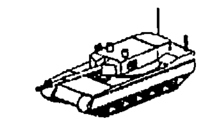
Protection

Improved survivability is a function of not being seen, detected, hit, and killed. The Army is pursuing a dual track to improve survivability. Detection and Hit Avoidance technology (Figures B-13,B-14,B-15) has the possibility of countering proliferation of precision guided weapons without developing equivalent armor. Advanced armor technology may defeat future weapons. The continued combined development of these concepts will improve survivability of the maneuver force.

Summary

Major improvements in a single technology rarely lead directly to a significant leap ahead in combat performance. The Mounted Force strategy is based on leap ahead performance resulting from advances in numerous subsystems which make up overall combat systems.

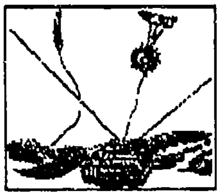
MOUNTED FORCES
RESEARCH DEVELOPMENT, AND ACQUISITION STRATEGY



ADVANCED TANK TECHNOLOGIES

VISION: A survivable, lethal, and more deployable crew of 2 or 3 in the 40-50 ton class.

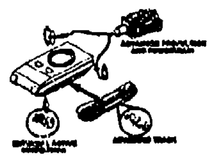
ATD: Demonstrate on a surrogate chassis:
- Reduced crew operation
- Aided target acquisition
- Hit avoidance



HIT AVOIDANCE

VISION: Light weight protection of armored vehicles that does not depend on heavy armor.

ATD: Demonstration of integrated hit avoidance technology, including threat sensors, countermeasures and active defensive threats.



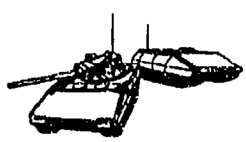
MOBILITY TECH DEMO

VISION: Highly agile and power efficient mobility systems for land combat vehicles.

ATD: Demonstrate on surrogate chassis advanced mobility subsystems: electric drive/ hybrid electric drive, active/ semiactive suspension, lightweight track, demonstrate improved HMMWV capability.

Figure B-14

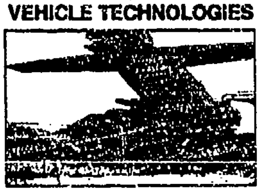
MOUNTED FORCES
RESEARCH DEVELOPMENT, AND ACQUISITION STRATEGY



ADVANCED VEHICLE TECHNOLOGIES

VISION: Highly capable combat vehicles that are significantly more deployable (smaller/lighter) and light as a part of the combined arms team.

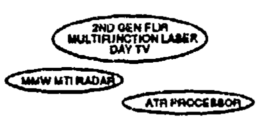
ATD:
Hit avoidance (survivability without heavy armor)
Combined Arms C2 (shared situational awareness)
2-man Future Main Battle Tank
Crewman's Associate (reduced tank crew size)
Advanced Target Acquisition
Composite Armored Vehicle



COMPOSITE ARMORED VEHICLE

VISION: Lighter weight ground combat vehicles using advanced composites.

ATD: Demonstration of advanced composites, signature management technology and advanced lightweight armors, on platform emphasizing manufacturability repairability, non-destructive testing and structural integrity.



TARGET ACQUISITION ATD

VISION: Aided target acquisition and prioritization at extended ranges to allow reduced crew workload/time lines in support of lethal, deployable combat vehicles with smaller crews.

ATD: Demonstration of long range FLIR// sensor suite with aided target acquisition and rapid search
- Second Generation FLIR with automatic pan algorithms/real time processing.
- Automatic tracking
- Improved situational awareness
- Exploitation of advanced target acquisition
- MMW/FLIR fusion (enhanced program)

Figure B-15

SECTION 5

TRAINING

Modernization of mounted forces requires a major shift in the training strategy to offset new training safety concerns, environmental sensitivities, and higher training cost. Training techniques and procedures for mounted forces are being improved due to the Louisiana Maneuvers (LAM) exercises and Mounted Battle Lab experiments. Additionally, Advanced Warfighting Experiments (AWEs) focus on and test new training concepts and techniques in a force-on-force environment with actual soldiers, leaders, and equipment, in order to enhance the further modernization of our mounted forces.

The primary focus of training device modernization for the mounted force is to allow individuals, crews, and units to attain and maintain the highest levels of proficiency at the most affordable cost. Current and future training devices for our mounted force include:

Advanced Gunnery Training System (AGTS)--A technology advanced conduct of fire trainer which offers improved capabilities and training of gunners and vehicle commanders of all Abrams tanks, Bradley Fighting Vehicles, and the Armored Gun Systems. AGTS provides Second Generation Forward Looking Infrared optics, free movement through the training database, and linked precision gunnery for platoons. First Unit Equipped is 1QFY 96.

Tank Conduct of Fire Trainer (UCOFT/MCOFT)--Trains gunners and tank commanders using simulated battlefield environments. Future tank developments will create additional unfunded modernization requirements. These systems are being modernized and cascaded to the National Guard as we modernize the force. There is currently a one year backlog between fielding Abrams tanks and National Guard units fielding their M1/M1A1 UCOFT's.

Training remains critical to maintain the Army's warfighting capabilities. Our training techniques and systems must reflect the more lethal and more flexible Army of the future and must contribute to the greater variety of missions that the Army is expected to carry out. The mounted force training strategy uses multiple training means to develop and improve skills from soldier to unit. Units will continue to focus their training on Mission Essential Task Lists (METL), but their training will also incorporate a wide range of future combat and OOTW scenarios.

For additional information about Army-wide training initiatives, fielding, and funding status, see Annex R, Training.

SECTION 6

CONCLUSION

The Army must be versatile, lethal, deployable, sustainable, and capable of victory in any operation.

The mounted forces must be able to project lethal and survivable combat power quickly anywhere and at anytime. The Abrams tank and Bradley Fighting Vehicle continue to be the mainstay of the armored force and the force projection Army. The M1A2 and M2A3 provide needed upgrades in fire control, POS/NAV, situational awareness and later in Second Generation Forward Looking Infrared (FLIR). The strategic environment today demands an Army which uses high technology systems that increase battlefield tempo, lethality, situational awareness, and survivability. Emphasis must be on designing, developing, and procuring weapons systems that are durable, multipurpose, and made of lighter weight composite armor (i.e., Future Scout Vehicle). Embedded technologies will increase the availability, reliability, and maintainability of our mounted forces.

Our Mounted Force modernization strategy will ensure that this Nation has the capability to respond with overwhelming combat power now and into the next century.

MOUNTED FORCE CAPABILITY

A DOMINANT MOUNTED FORCE:
- **IMMEDIATELY RESPONSIVE**
- **QUICKLY DEPLOYABLE**
- **SUPERIOR TECHNOLOGY**
- **INCREASED SURVIVABILITY**
- **DECISIVE COMBAT POWER**

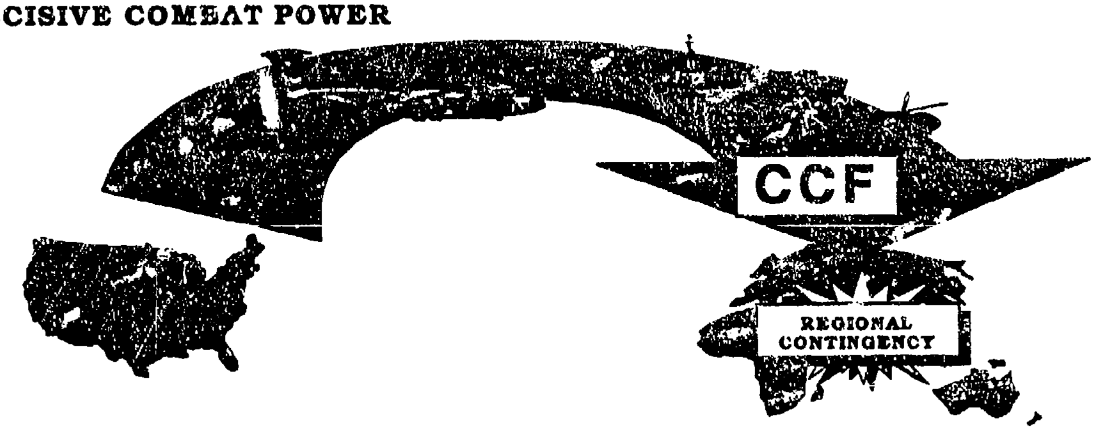


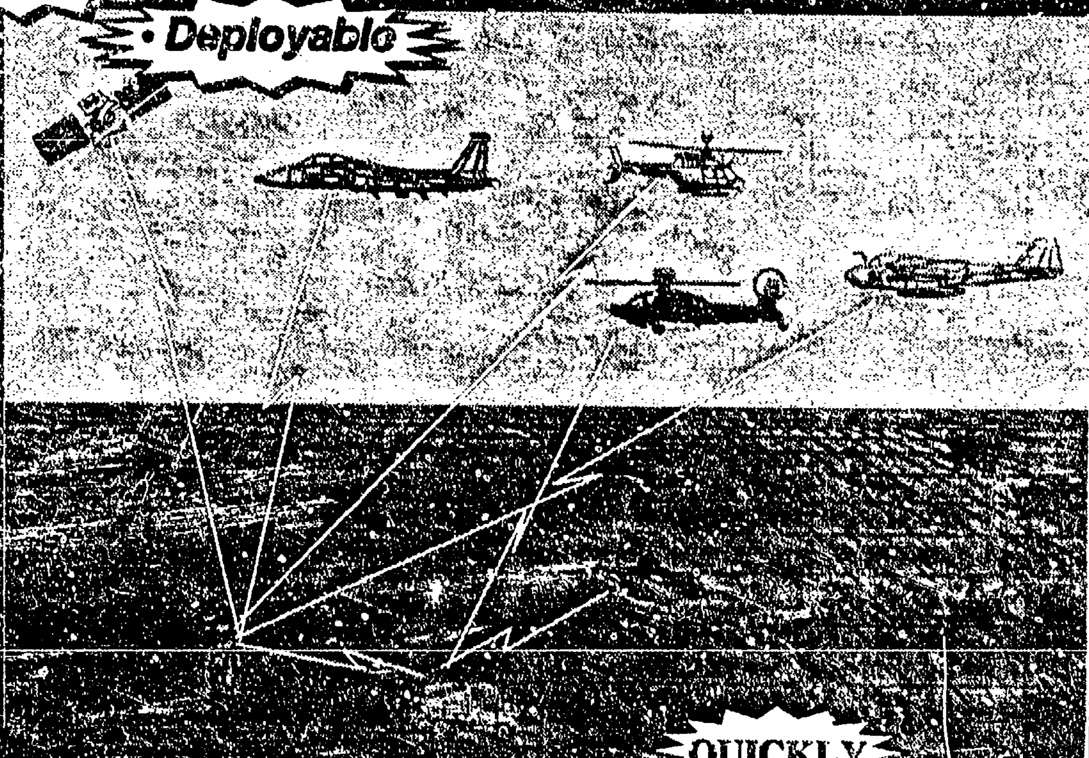
Figure B-17

ANNEX C

COMBAT - LIGHT

LIGHT FORCES THAT ARE -

- *Lethal*
- *Responsive*
- *Versatile*
- *Deployable*



WILL WIN

QUICKLY

DECISIVELY

WITH MINIMUM CASUALTIES

ANNEX C

CLOSE COMBAT - LIGHT

SECTION 1

INTRODUCTION

Light Forces are combat, combat support, and service support units that participate in and support non-mechanized and non-special military operations. This definition includes all branches and forces which provide close support to light, airborne, and air assault units. Light forces are our principal quick reaction, early entry and lead force in almost any forced entry operation. Light forces must have capabilities that enable them to win swiftly and decisively with minimum casualties, as illustrated in Figure C-1.

There are many programs in The Army Modernization Plan that are relevant to several annexes. The Light Forces annex will not duplicate discussions contained in other annexes. For instance, the Enhanced Land Warrior program, important to Light Force modernization, is more appropriately contained in Annex N - Soldier.

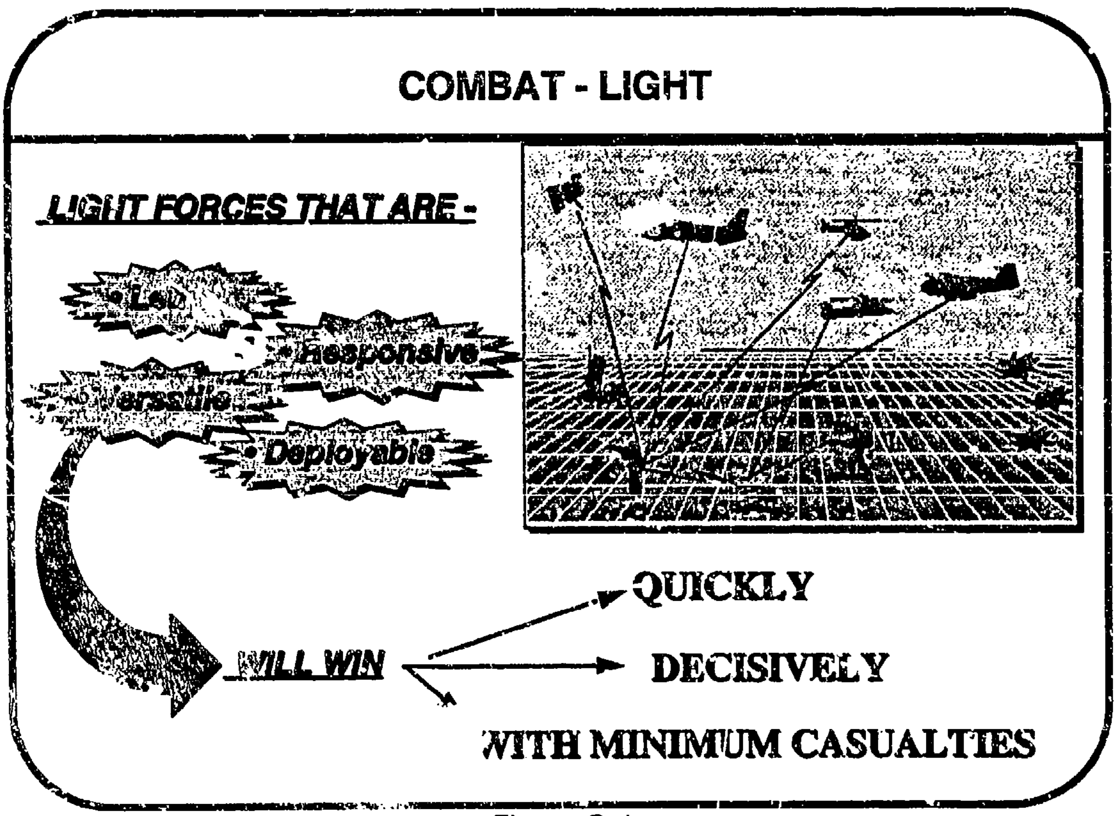


Figure C-1

SECTION 2

WARFIGHTING CONCEPT

The Army's Light Forces have unique capabilities and strengths, making them far different than other forces. The strategic environment demands substantial commitment to Light Forces. In the past few years we have witnessed increased regional instability and transnational dangers. Consequently, we have deployed ever-increasing numbers of Light Forces to promote stability and thwart aggression. The Army's Light Forces support the National Military Strategy through Peacetime Engagement, Conflict Prevention, and Fighting to Win.

Peacetime Engagement

Light Forces have become, and are very likely to remain, the "option of choice" for Peacetime Engagement. Light Forces offer the greatest opportunities to establish meaningful military-to-military contacts that build confidence and support regional cooperation because the majority of the developing Third World nations have infantry (light) armies. Further, natural and manmade disasters, such as Hurricane Andrew and the refugee crisis in Rwanda, required quick and tailored responses that only Light Forces fulfilled. Likewise, peacekeeping and peace-enforcing operations--such as in the Sinai Desert, Macedonia, and Haiti--have demonstrated the effectiveness and efficiency of Light Forces. Finally, in OOTW, Light Forces are the most suited for population control.

Conflict Prevention

By the very nature of their posture and capabilities, Light Forces also prevent conflict. They deter by virtue of their presence or their quick reaction and power projection. Stationed at or near-by potential hot spots, Light Forces can cause trouble-makers to turn away from actions that could threaten regional stability. Even when not near probable trouble spots, Light Forces can deploy in a matter of hours, when they are called upon to deter conflict. Light Forces are ideal for civil disturbance, counterdrug, peacekeeping, and more hazardous peace-enforcement and counterinsurgency operations.

Fight to Win

If deterrence fails, Light Forces are likewise capable of conducting forced entry operations. Their quick strategic response capability, combined with their considerable tactical versatility, and firepower means Light Forces can establish the requisite conditions for victory by follow-on heavier conventional forces or terminate conflicts before heavier forces are needed. Light Forces dominate battle space through high-tempo, around-the-clock, all-weather, and air/ground operations. Technology and the quality of our soldiers determine the doctrine used by Light Forces. Overmatches in Light Force combat power -- maneuver, firepower, protection, leadership, information, and "owning the night", -- are essential to maintaining the edge against potential adversaries.

Digitization

Light Forces in the "Information Age" integrate weapons, systems, and soldiers through modern computer technology used by intelligent, disciplined, tough, and resourceful soldiers. Technological advancements in command and control leverage Light Force combat power. Digitizing Light Forces permits communication between all units. Deciders, shooters, and supporters have the information needed when it is needed to operate synergistically with others in the force. Individual soldiers in the Light Force can take independent actions because they have enhanced situational awareness and a common view of what needs to be done. Light Force Battle Command attains greater performance levels in speed, space, and time, which in turn allow the acceleration and compression of operations to seize the initiative from the enemy. The Battle Command system is a commander and soldier system which reduces the chance, fog, and friction of battle.

Firepower

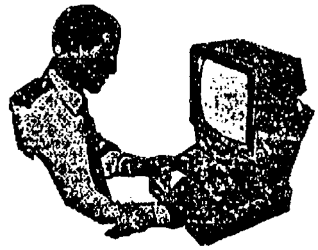
Light Force firepower--direct and indirect precision fires--must overmatch enemy capabilities in range, target acquisition, accuracy, and lethality. Improved target location and digitized sensor-to-shooter linkages greatly improve the accuracy and responsiveness of close fire support systems. The nature of highly dispersed future battle requires increased communications, navigation, location-monitoring, protection, and digital linkages to supporting weapon systems. Modern technology empowers Light Forces with unprecedented precision firepower, available in minutes, to strike hardened and mobile targets at long ranges without normally associated collateral damage. Light Forces need smaller, lighter, and a reduced variety of munitions to decrease supply load and space demands. They also need munitions which can be used against a wider array of targets. Light Forces use versatile surface-to-air missiles to detect and engage enemy rotorcraft, tactical aircraft, unmanned aerial vehicles, and tactical missiles. The sensor-to-shooter loop in Light Forces is shortened. Lightweight directed energy weapons are used to detect the enemy at greater ranges, jam fire

control and command and control systems, and increase Light Force night fighting capabilities. Finally, the need for weapons and tactics that reduce collateral damage has recently increased due to the employment of Light Forces in OOTW.

Mobility and Maneuver

Light Forces must possess equipment made from stronger lightweight materials and incorporate lightweight power supplies. General purpose cargo vehicles must be able to load, transport, and off-load materials faster to increase the tempo of resupply. Light Force mobility and maneuver improvements are achieved by decreasing the weight of equipment, increasing the capability to overcome terrain restrictions and obstacles, and optimizing the performance of equipment.

Leadership and Training



Light Forces use advanced distributed simulations, displays, microprocessors and information technology for timely unit and leader training, mission planning, and rehearsals. Prior to deployment and enroute, Light Forces train through interactive simulations and live models. Light Forces at different locations can train together through a combination of virtual, constructive, and live simulations.

Protection

Light Forces use unmanned aerial and ground vehicles equipped with multiple advanced sensors with automatic target recognition, over-the-hill reconnaissance and surveillance, chem-bio and mine detection. Long-endurance unmanned vehicles with high-resolution video, filmless cameras, and follow-on generation, Forward-Looking Infrared Radar (FLIR) are employed at the lowest tactical levels. Automated systems reduce the length of Light Force operations and thus reduce friendly casualties. Combat identification technologies reduce incidents of fratricide, and electromatic systems protect Light Force soldiers, materiel, and critical nodes from indirect radio frequency proximity fuzed munitions.

SECTION 3

CURRENT PROGRAM ASSESSMENT

The Army's current Light Force modernization programs are explained and assessed in terms of their importance to and impact on the Light Force warfighting concepts (Figure C-2). The Light Force programs are either in the Tech Base, in Research and Development, or in Procurement. Tech Base programs are also discussed in Section 4.

Each program is rated **RED**, **AMBER**, or **GREEN**:

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and,

GREEN -- Adequate capability and quantity exists to perform the mission.

An overall rating is indicated for each of the Light Force warfighting concepts, in near-, mid- and far-terms at the end of this section.

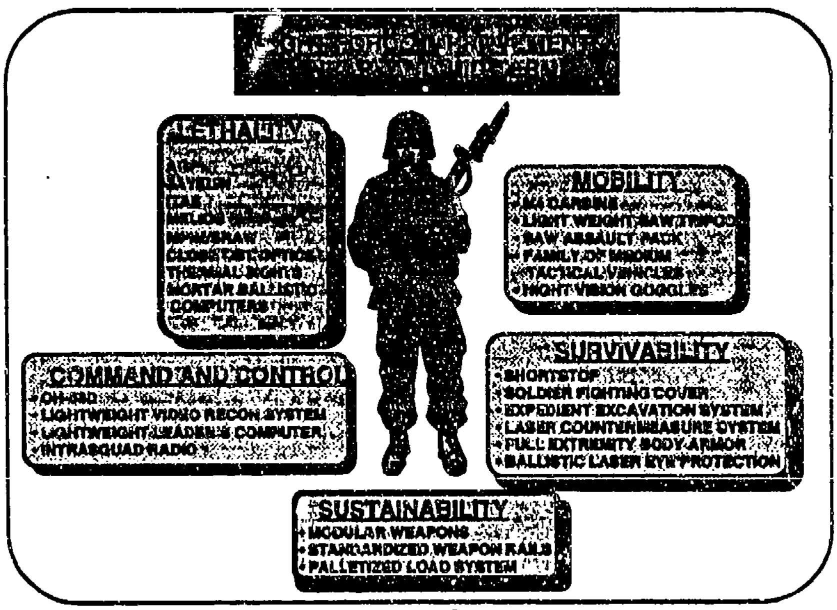


Figure C-2

Digitization

During the past two years, digitization of the Army, including its Light Forces, has become the main method of maintaining Land Force Dominance. A Light Force with better command and control, shared situational awareness, and agility made possible

by digitization, may defeat a larger, heavier force quickly, and with fewer casualties, than might be expected. Several systems that provide digitization to the Light Force are being fielded or developed.

Improved Mortar Ballistic Computer (IMBC). The IMBC replaces the present M23 Mortar Ballistic Computer which now has obsolete components, cannot be expanded, and will be unsupportable after FY 96. The IMBC provides digital message capability and mortar firing data computations which are both compatible and integrated with modem automated field artillery fire control systems. The IMBC has an embedded GPS. Procurement begins in FY 96, but there is **insufficient funding to procure more than 489 of the required 1350 systems; AMBER.**

Digitized Mortar Fire Control System (DMFCS). The DMFCS integrates mortar platoons, sections, and gun squads with the Army's digital battlefield. Additionally, it allows mortars to widely disperse and operate in a semi-autonomous manner, greatly increasing their survivability. Key components of the DMFCS include: a computer with embedded GPS, a direction determining device with a collimator, and a dedicated SINCGARS. Mortar units equipped with DMFCS can deliver more accurate fires at twice the rate of present-day units. Although current technology exists to develop and field the DMFCS by FY 98, **funding is not available until FY 02; RED.**

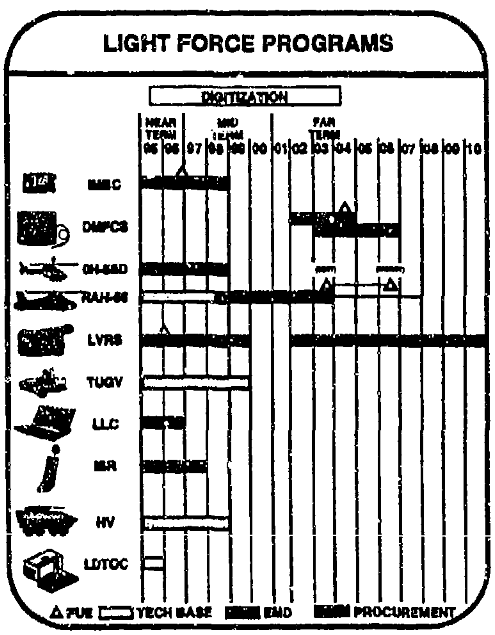


Figure C-3

Kiowa Warrior (OH-58D). The OH-58D is a single engine armed reconnaissance/security helicopter. It possesses a mast mounted sight with day/night/adverse weather optics. The OH-58D also has embedded digitization that detects/identifies targets and can digitally hand off targets to other platforms for precision strikes using Hellfire missiles or other ordnance. The OH-58D is needed to offset the retirement of the OH-58A/C and replacement of the AH-1 Cobra, as well as to bridge to the Comanche. The Army is **funded for only 366 OH-58Ds of a requirement for 507**. Light Forces in Force Packages 3 and 4 are currently unresourced; **AMBER.**

Comanche (RAH-66). The RAH66 is a dual engine armed, low observable reconnaissance/light aircraft equipped with Longbow Radar/2nd Generation FLIR, advanced avionics, enhanced supportability, precision fire control/weapons, aided target recognition/classification, and embedded digital capabilities. The latter provides

maneuver commanders with a common picture of the battlefield. The RAH-66 is self-deployable to a range of 1,260 nautical miles; **AMBER.**

Lightweight Video Reconnaissance System (LVRS). The LVRS has an outstation, weighing less than 16 lb, which transmits still-frame video through the SINCGARS radio, and a base station that receives, processes, stores, displays, prints, and retransmits to other base stations. The LVRS improves information gathering capabilities for recon units. The LVRS completes type classification in 3rd Qtr, FY 95 and enters production in FY 95 (through FY 97); **GREEN.**

Tactical Unmanned Ground Vehicle (TUGV). The TUGV is a teleoperated ground wheeled vehicle that can be operated from a distant location during limited visibility. Its several optional sensor suites provide real-time route/point reconnaissance, and NBC and target acquisition information without exposing its operator to countermeasures. The TUGV, a joint program led by the USMC, is in Research and Development and **will not enter procurement until FY 00; RED.**

Lightweight Leader Computer (LLC). The LLC is a small lightweight computer that integrates leaders from squad to company to the digital battlefield. It helps leaders plan operations; prepare and distribute orders, reports, alert messages; quickly access stored information; perform simple graphics capabilities; and interface with SINCGARS for data transmission. The LLC is currently undergoing Research and Development (through FY 96). **Production for the LLC is unfunded; RED.**

Individual Soldier Radio (ISR). The ISR, weighing less than 30 ounces and with a range of 700+ meters, is an intra-squad radio that enhances command and control, and expedites transmission of orders and other information within the squad. The ISR enters type classification in FY 95. **Procurement of the ISR is currently unfunded; RED.**

Hunter Vehicle (HV). The HV is a Tech Base program to demonstrate low cost NDI or modified NDI with increased survivability and reduced signature hunter vehicles. These vehicles possess targeting sensors and command and control connectivity to remote weapon systems. The medium helicopter-transportable HV is used to target stand-off weapons and perform deep reconnaissance for Light Forces; **GREEN.**

Lightweight Digital Tactical Operations Center (LDTOC). The LDTOC, a man portable system, provides digital information interface to Light Forces: digital transmission and receipt of orders, situational awareness, and other data as outlined in Force XXI Battle Command - Brigade and Below. The LDTOC is a new program; it will undergo experimentation at the Rapid Force Projection Initiative (RFPI)-C4 ATD at the JRTC in November, 1995, and could progress into development in FY 96. Currently, the **LDTOC is not funded for development or procurement· RED.**

Firepower - Small Arms

Small arms are the individual and crew-served weapons that soldiers carry into battle. Their accuracy and lethality at long ranges, their lightweight, and their ease of maintenance in all types of weather, terrain, and visibility give each soldier effective combat power on the battlefield.

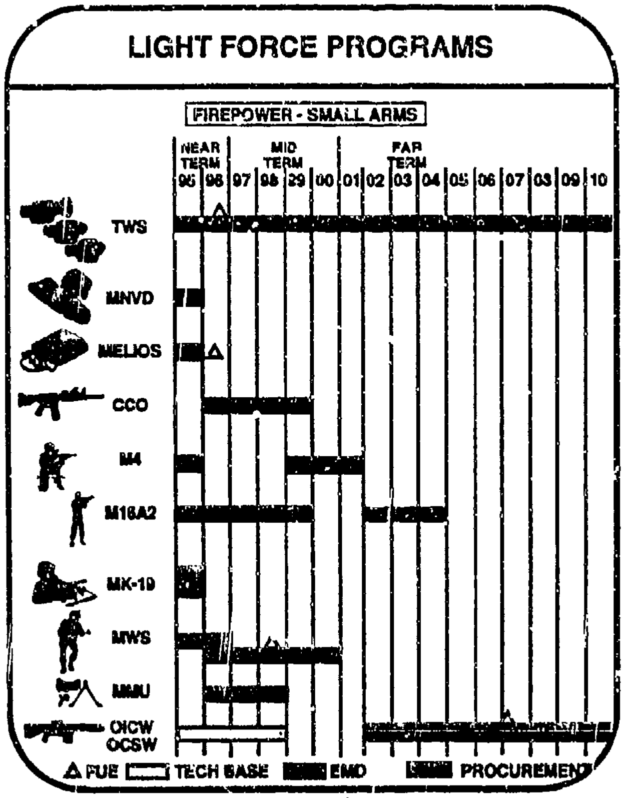


Figure C-4

Thermal Weapon Sight (TWS). The TWS is a family of lightweight, c npact, battery operated, second generation, thermal imaging devices that begin full production in FY 95 after operational testing is completed. The TWS will mount on the M16 rifle, M4 Carbine, M249 Squad Machine Gun, M60 Medium Machine Gun, and the .50 caliber Heavy Machine Gun. First Unit Equipped will occur in 3rd Qtr, FY 96. The planned procurement extends out to FY 08, but **will only fill Force Package 1 requirements; AMBER.**

Monocular Night Vision Device (MNVD). The MNVD, a lightweight, monocular, 3rd generation image intensification device, can be handheld, head or helmet mounted or mounted on a weapon, and has performance characteristics similar to the AN/PVS-7B, Night Vision Goggles. The MNVD is funded for type classification during FY 95, and is **not funded for procurement; RED.**

Mini Eyesafe Laser Infrared Observation Set (MELIOS). The MELIOS, a lightweight, eyesafe, handheld, battery powered laser rangefinder, accurately measures ranges to 10,000 meters (+/- 5 meters). The Army has funded 8,005 MELIOS, a **quantity which fields MELIOS only to Force Packages 1, 2 and the active forces in Force Package 3; AMBER.**

Close Combat Optic (CCO). The CCO is a non-magnified, long eye relief optical sight for the M16 rifle and M4 carbine. The aiming dot on the lens is easily placed on the target, improving combat marksmanship to 300 meters. Used with both eyes open, the CCO eliminates the difficulty of aligning iron sights with one eye closed. The CCO allows firer's greater situational awareness. The CCO is now in Developmental and Operational Testing. Procurement funding begins in FY 96; **GREEN.**

M4 Carbine (M4). The M4, a shortened version of the M16A2 rifle, and having some 80% of its parts identical to those of M16A2, is used primarily by airborne and air assault forces. However, it replaces all of the Army's .45 caliber M3 Submachine guns and the M16A2 rifles carried by soldiers with excessive loads. Fielding for the M4 begins in FY 95. The Army **does not have sufficient funds to pure fleet Light units in Force Package 1; AMBER.**

M16A2 Rifle (M16A2). The M16A2, the primary combat rifle for all Services, is semiautomatic, with the capability to fire single shots or three round bursts, and uses 5.56mm ammunition (as does the M249 SAW). First fielded in FY 88, the **Army has purchased only 79% of its requirement.** This percentage includes upgrades to the M16A1 rifle. No additional procurement funding is planned; **AMBER.**

MK-19 40mm Automatic Grenade Machinegun (MK-19). The MK-19 is an automatic grenade launcher that fires 40mm bursting munitions. It is designed to provide suppressive fire against personnel and lightly armored vehicles out to a range of 1600 meters against point targets and 2200 meters against area targets. The Army has procured enough MK-19s to equip through 28% of Force Package 3. This equates to 58% of the total Army requirement. There is **no procurement funding planned after FY 95; AMBER.**

Modular Weapon System (MWS). The MWS is an add-on upgrade that provides multiple, standardized mounts for the M16A2 rifle and M4 carbine. This permits combinations of various accessories to be mounted simultaneously. The accessories include: day optic, night vision device, laser aiming light, grenade launcher, flashlight, and training device. The MWS is to be type classified in 2nd Qtr, FY 95. **Other than a limited procurement beginning in FY 96 for the Land Warrior program, procurement of the MWS for the remainder of the Light Forces is not currently funded; AMBER.**

Medium Machinegun Upgrade (MMU). During FY 94, the Army concluded that the M249 Squad Automatic Weapon does not withstand the sustained rate of fire required of a medium machinegun. Therefore, the Army will retain its 7.62mm machinegun. With Congressional support, a shoot-off between the M240G and M60E4 medium machineguns will occur. The winner of the shoot-off will replace the aging M60A1 machineguns. **Procurement of the MMU is currently unfunded; RED.**

Objective Crew-Served Weapon (OCSW). The OCSW is a Tech Base program to design the next generation of the crew-served automatic weapon. It will be carried by two soldiers, will have a laser range finder and day/night sight, and will fire a family of bursting and kinetic energy munitions; **GREEN.**

Objective Individual Combat Weapon (OICW). The OICW is a Joint Service ATD in Tech Base to design the next generation individual combat rifle. It will include a laser range finder, day/night sight, ballistic computer, and fire a family of fuzed bursting and kinetic energy munitions. The OICW is approved as an ATD for FY 95-98; **GREEN.**

Firepower - Antitank

Providing Light Forces with overmatching, stand-off antitank weapons ensures their versatility and survivability on the battlefield. Without long-range, accurate, and lethal antitank weapons Light Forces cannot contend with 21st Century warfare.

Javelin. The Javelin is a joint Army/USMC program; a man portable medium antitank weapon that replaces the obsolete Dragon. The Javelin has an integrated day/Second Generation Forward Looking Infrared (FLIR) sight; a range exceeding 2,000 meters, a lock-on before launch, fire and forget capability that can be selected for direct or top attack; and can be fired from enclosures. The Javelin is the number one antitank priority for Light Forces. The Javelin is to be fielded in 3rd Qtr, FY 96, but is **funded to field Active Component forces only; AMBER.**

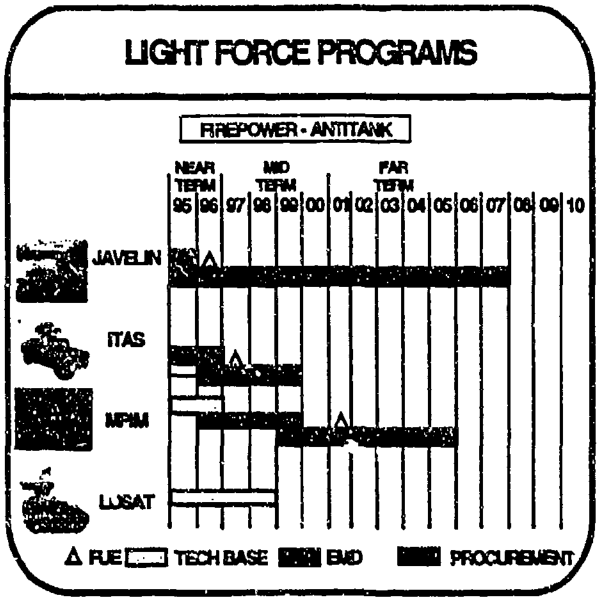


Figure C-5

Improved Target Acquisition System (ITAS). The ITAS upgrades the TOW heavy antitank weapon system now in Light Force units. ITAS improves target detection, acquisition, fire control, and recognition range and has 2nd Generation FLIR, direct view optics, laser range finder, autoboresight, autotrack, BIT/BITE, and embedded training. Currently in Research and Development, ITAS begins fielding in 4th Qtr, FY 97. The ITAS is **funded for Light Forces in most of Force Package 1; AMBER.**

Multi-Purpose Individual Munition (MPIM) / Short Range Anti-tank Weapon (SRAW). The MPIM/SRAW, a light, disposable, multi-purpose weapon that replaces the AT4, is capable of defeating personnel in bunkers, behind masonry and brick walls, and in light armored vehicles. The MPIM/SRAW has an effective range of 500 meters except against bunkers. It is safely fired when fired from enclosures and does not require a dedicated gunner. This is a joint program that uses a launch & flight module developed in the USMC SRAW program and uses the Army-developed MPIM warhead module. Research and Development occurs FY 96-99 with the First Unit Equipped in FY 01; **AMBER.**

Line of Sight-Antitank (LOSAT). The LOSAT provides a dedicated, highly mobile, all-weather, day/night, direct fire antitank kinetic energy weapon, capable of defeating future advanced tanks at ranges much greater than the TOW missile. The LOSAT incorporates a 2nd Generation FLIR. The LOSAT firing module is mounted on

an Armored Gun System chassis and is transportable in C-130, C-141, C-5, and C-17 cargo planes. Currently, LOSAT is in Tech Base as a Technology Demonstration FY 94-98, and is **not funded to enter development**; **RED.**

Army Aviation systems play a key role in Light Forces antitank fire capabilities.

Comanche (RAH-66). The RAH-66 performs attack helicopter operations for Light Forces. Given its extended range and antitank/antipersonnel capabilities, its principal role is armed reconnaissance aiding force protection and integrated precision strike and maneuver; **RED.**

Kiowa Warrior (OH-58D). Until Comanche is fielded, the OH-58D Kiowa Warrior is the primary attack helicopter for Light Forces; **AMBER.**

Firepower - Direct and Indirect Fire Support

Direct and indirect fire support is crucial to success on the battlefield. Light Forces use fire support to attrit and suppress enemy units, shape the battle in depth, and set the conditions for victory while minimizing collateral damage.

Armored Gun System (AGS). The AGS, a lightly armored, direct fire weapon system which replaces the obsolete M551 Sheridan, will be the Army's first large caliber, direct fire combat vehicle with a three man crew and a main gun autoloader. The AGS is transported in or can be delivered by low velocity air drop from C-130 aircraft. The XVIII Airborne Corps and 2d Armored Cavalry Regiment (Light) are to receive the AGS. Early User testing begins in FY 95 with procurement funding beginning in FY 96; **GREEN.**

Precision Guided Mortar Munitions (PGMM). The PGMM program is a Tech Base ATD to demonstrate precision indirect fire support against high value targets using mortar munitions. It substantially increases the lethality and survivability of mortar units. The program culminates with the integrated RFPI demonstration in FY 99. The PGMM is **not funded for transition to Research and Development**; **AMBER.**

Advanced Towed Cannon System (ATCAS). The ATCAS is a Tech Base TD program to demonstrate how the automatic laying, loading, and firing of a towed, lightweight, 155mm howitzer, (using the entire family of 155mm munitions), will increase its lethality and improve its transportability. The capabilities will significantly increase the rate of fire and reduce crew requirements. The program is expected to enter Research and Development in FY 99; **GREEN.**

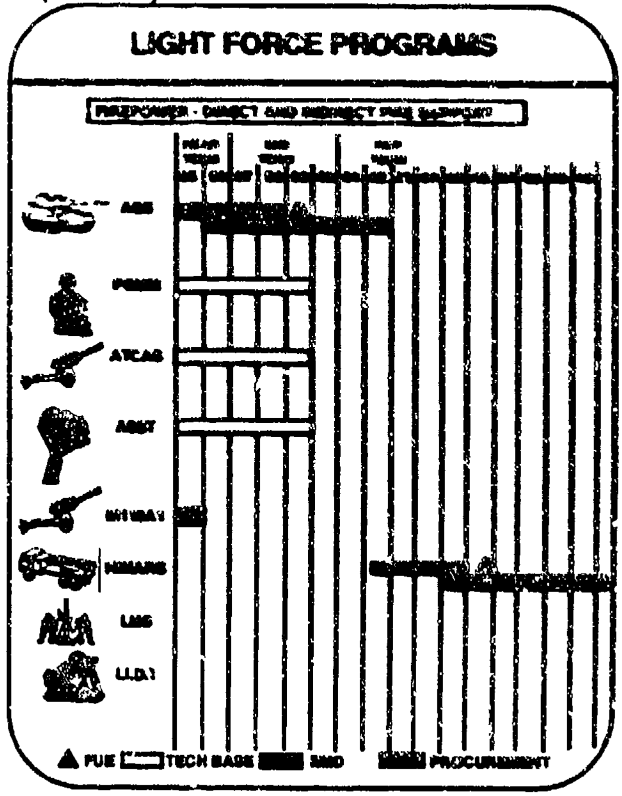


Figure C-6

Advanced Submunition Sensor Technology (ASST). The ASST program is a Tech Base TD program that provides smart munitions which are capable of attacking moving armor and differentiating among various target vehicles for the 155mm Howitzer. The program provides onboard Identification Friend or Foe (IFF) capability, to reduce the risk of fratricide in close combat. ASST also holds potential for application to SADARM plus BAT pre-planned product improvements; **GREEN.**

105mm Towed Howitzer (M119A1). Compared to the Vietnam-era M102 towed Howitzer now in the Light Forces, the M119A1 provides extended range and lethality. It fires to a range of 11,400 meters (unassisted) and 19,500 meters (assisted). And, due to its light weight, the M119A1 can be carried by a Blackhawk helicopter. Procurement of the M119A1 ends in FY 95. Fielding to **70% of Force Package 3 and all of Force Package 4 is not resourced; AMBER.**

High Mobility Artillery Rocket System (HIMARS). The HIMARS is a lightweight, truck-mounted rocket launcher which fires the entire MLRS family of munitions to a range of 50 km and is transportable by C-130. The HIMARS is programmed to begin development in FY 02. **Procurement will not begin until FY 05** with the First Unit Equipped in FY 06; **RED.**

Lightweight Mortar System (LMS). The LMS is a proposed program that would replace Light Force 81mm mortars with 120mm mortars. The use of composite materials and an enhanced energy absorbing recoil device could reduce the weight of the 120mm heavy mortar by over 60%. The 120mm mortar has significantly greater range and lethality. Further, replacing the 81mm mortar with the 120mm mortar would

standardize the battalion-level mortars throughout both Light and Mounted Forces. The LMS is **not funded for development or procurement; RED.**

Lightweight Laser Designator Rangefinder (LLDR). The LLDR provides Light Force fire support teams plus combat observation and lasing teams a lightweight (total 30 pound) laser designator that has range-to-target, azimuth and vertical angle, and target marking for precision or laser-guided munitions. LLDR is **not funded for development or procurement; RED.**

Mobility and Maneuver

Light Forces must not allow terrain, obstacles, or darkness to limit their effectiveness. Furthermore, they must use well-placed smart obstacles and sensors to increase their effectiveness and finally, they must use resupply and sustainment equipment that has improved mobility. This combination of capabilities will offer Light Forces greater fighting tempo, improved survivability, and quicker success on the battlefield.

Night Vision Goggles (AN/PVS-7B). The AN/PVS-7B permits soldiers to fight at night. This head-mounted night vision device uses 3rd generation image intensification tubes, allowing detection, under starlight, of man-sized targets to 150 meters. **The Army is only funded to resource Force Packages 1 through 3; AMBER.**

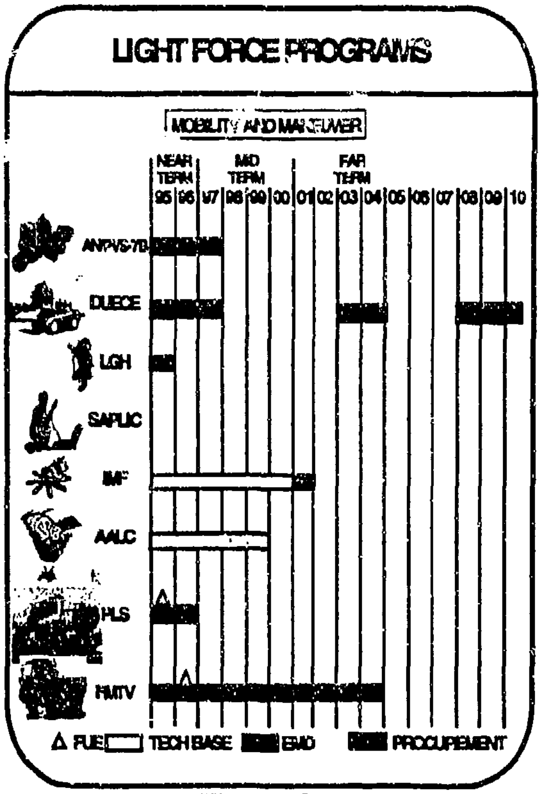


Figure C-7

Deployable Universal Combat Earthmover (DUECE). The DUECE provides earth moving for Light Forces in support of mobility, countermobility, survivability, and sustainment roles. It can attain speeds of 35 mph and is C-130 transportable. The DUECE begins production in FY 96 with deliveries beginning in FY 97. **Current program funds 90% of FP 1 during POM.** The remaining requirements are not met until FY 10; **AMBER.**

Launched Grapnel Hook (LGH). The LGH is a lightweight grapnel system used to breach minefields that employ trip wires. It is deployed via a "rifle grenade" launcher. Development of the LGH is to be complete in FY 95. **No procurement funds** have yet been identified. An estimated $2.32 million would procure 5,702 systems for Force Package 1; **RED.**

Small Projected Line Charge (SAPLIC). The SAPLIC, a man portable line charge system, creates a .4 meter wide by 50 meter long breach in surface laid anti-personnel minefields. Like the LGH it is deployed by a "rifle grenade" launcher. The SAPLIC program is **not currently funded**. An expedited two year development and type classification program can be resourced at $6.1 million. Production forecasts estimate $15.1 million to procure 2,000 systems for a Force Package 1 contingency stockpile; **RED.**

Intelligent Minefield (IMF). The IMF is a Tech Base ATD. The program demonstrates effective command and control of interactive minefields containing sensor arrays and smart anti-armor mines. After a successful ATD, the IMF is expected to enter EMD in FY 01; **GREEN.**

Advanced Airdrop for Land Combat (AALC). The AALC is an ATD that demonstrates the Guided Parafoil Air Delivery System (GPADS), a high-altitude, offset cargo airdrop system. The GPADS minimizes aircraft vulnerability to low-altitude threats and enhances the rapid deployment of combat-essential payloads. The parafoil system is a gliding parachute which allows delivery of loads up to 21 tons (gross) from 25,000 feet above ground level with automated navigation, increased accuracy (within 100 meters of target), up to 12 mile offset, and reduced impact velocity. The AALC ATD is **funded at 50% to transition this technology to full-scale development by FY 99; AMBER.**

Palletized Load System (PLS). The PLS is a 16.5 ton capacity vehicle composed of a prime mover with integrated self-load/unload capability, a 16.5 ton trailer, and demountable cargo beds called flatracks. It reduces the requirement for material handling equipment, personnel and trucks. It will be issued to Forward Support Battalions in the Light Forces. First Unit Equipped occurred in FY 94. Production funding, which ends in FY 96, **does not complete FP 4; AMBER.**

Family of Medium Tactical Vehicles (FMTV). The FMTV are 2-1/2 and 5 ton medium tactical trucks which replace obsolete and maintenance-intensive vehicles now in the Light Forces. Several models of the FMTV perform myriad support tasks. The models have 85% commonality of parts among them, meaning significantly lower operations and maintenance costs. First Unit Equipped will occur in FY 95. Funding for FY 96 **only procures 52% of the Force Package 1 requirement of 10,843 trucks; AMBER.**

Utility Helicopter (UH-60). Air assault helicopter forces improve the mobility maneuver capabilities in Light Forces. Fielding the improved UH-60L to Light Forces is needed. See Annex O (Aviation) for details.

Leadership and Training

System Training Devices. For some time the Army has procured system specific training devices in tandem with the development and fielding of new systems.

Accordingly, the Javelin and AGS will be fielded with a suite of unique devices to teach operations and maintenance tasks related to these systems. This significantly reduces training cost and increases the service life of these systems; **GREEN.**

Embedded Training Devices. ITAS incorporates an embedded training device which presents displays, sequences, and responses equal to those of the actual system. Such realistic representation of system operation trains soldiers effectively and may reduce the time spent in large maneuver areas or ranges; **GREEN.**

Rapid Force Projection Initiative (RFPI). The RFPI is a Tech Base umbrella Top Level Demonstration (TLD). Contributing ATDs provide significant training products to Light Forces as an outgrowth to extensive simulation efforts. The majority of simulator products will be resident at the RFPI Program Management Office (Redstone Arsenal, AL) and the Dismounted Battle Space Battle Lab at the Army's Infantry School (Ft. Benning, GA). Simulators at other locations will be arranged on a case-by-case basis during conduct of the program; **GREEN.**

Protection

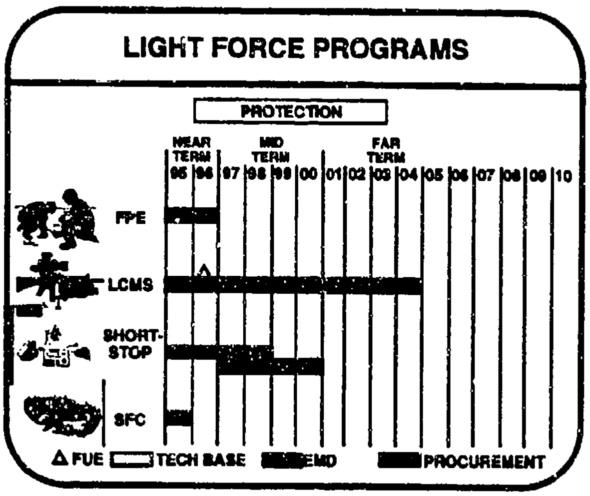


Figure C-8

The most important and non-replaceable asset on the battlefield is the soldier. Light Forces place high value and great emphasis on protecting soldiers for, as the moniker, Light Forces, implies, these troops normally do not fight under armor. The extra measures of protection against the enemy's most lethal and powerful weapons, namely indirect and mobile weapon systems, reduce Light Force casualties and increase the likelihood of victory.

Fighting Position Excavator (FPE). The FPE consists of a multiple use hand operated auger and an explosive kit. Together, these loosen soil and speed the soldier's ability to dig a deliberate fighting position. Type classification of this NDI system is to be complete in FY 95. **No production funds** have been identified. An estimated $.831 million is needed to procure approximately 10,000 complete systems and 20,000 extra explosive kits. However, this amount would only support the Force Package 1 requirement; **RED.**

Laser Countermeasure System (LCMS). The LCMS is an NDI one-man portable, battery operated laser weapon that detects and jams fire control optics on ground and aerial systems at extended ranges. It out-ranges direct fire systems. An LRIP decision is scheduled in 2nd Qtr, FY 95 with First Unit Equipped occurring a year

later. The current NDI system weighs in at over 40 pounds. **Additional funding is required** to develop a system that weighs less and achieves a greater range; **AMBER.**

Shortstop. The Shortstop counter-mortar and artillery system began development in FY 94. **Production will not begin until FY 97; AMBER.**

Soldier Fighting Cover (SFC). The SFC is a lightweight, prefabricated cover system for a two-soldier fighting position. When combined with a soil cover, it provides protection from small arms and artillery near misses. The SFC greatly reduces requirements for Class IV materials. Type classification of this system is to be completed in FY 95. **No procurement funds are currently allocated** to produce this system; **RED.**

Assessment of Light Force Modernization

In general, Light Force Modernization is headed in the right direction. However, due to reduced funding, the development and procurement of several important systems have been postponed, extended, or reduced. The latter results in significantly different levels of modernization within various Force Packages, and means that Light Forces deployed to fight a second near-simultaneous Major Regional Conflict, may have a difficult time achieving a quick, decisive victory with minimal casualties. Likewise, those engaged in OOTW may find their task far more difficult or require far more time to achieve.

Summary of Systems Rated GREEN
Lightweight Video Reconnaissance System (LVRS)
Hunter Vehicle (HV)
Close Combat Optic (CCO)
Objective Crew-Served Weapon (OCSW)
Objective Individual Combat Weapon (OICW)
Armored Gun System (AGS)
Advanced Submunition Sensor Technology (ASST)
Intelligent Minefield (IMF)
System Training Devices
Embedded Training Devices
Rapid Force Projection Initiative (RFPI)

Figure C-9

Summary of Systems Rated AMBER

Comanche (RAH-66)	
Improved Mortar Ballistic Computer (IMBC)	only procures 489 of the 1350 required
Kiowa Warrior (OH-58D)	only procures 366 of the 507 required
Thermal Weapon Sight (TWS)	only procure Force Package 1
Mini Eyesafe Laser Infrared Observation Set (MELIOS)	only funds active forces
M4 Carbine (M4)	insufficient funding to pure fleet the Light units in Force Package 1
M16A2 Rifle (M16A2)	procures only 79% of the requirement
MK-19 Automatic Grenade Machinegun (MK-19)	no procurement funding planned after FY 95
Modular Weapon System (MWS)	no procurement except for the few quantities used in Land Warrior
Javelin	funded to field active component forces only
Improved Target Acquisition System (ITAS)	not funded for issue to all light units in Force Package 4
Precision Guided Mortar Munitions (PGMM)	not funded for Development
105mm Towed Howitzer (M119A1)	70% of Force Package 3 and all of Force Package 4 is not resourced
Night Vision Goggles (AN/PVS-7B)	not funded to resource Force Package 4
Deployable Universal Combat Earthmover (DUECE)	POM funds only 90% of Force Package 1
Advanced Airdrop for Land Combat (AALC)	funded at 50% to transition this technology into full-scale development by FY 99
Palletized Load System (PLS)	does not complete Force Package 4
Family of Medium Tactical Vehicles (FMTV)	only procures 52% of the Force Package 1 requirement of 10,843 trucks
Laser Countermeasure System (LCMS)	additional funding is required to reduce weight
Shortstop	no procurement funds until FY 97
Multipurpose Individual Munition (MPIM)	EMD not adequately funded, results in breaking cooperative EMD effort with USMC

Figure C-10

Summary of Systems Rated RED

Digitized Mortar Fire Control System (DMFCS)	funding is not available until FY 02
Tactical Unmanned Ground Vehicle (TUGV)	will not enter procurement until FY 00
Lightweight Leader Computer (LLC)	production for the LLC is unfunded
Individual Soldier Radio (ISR)	procurement of the ISR is currently unfunded
Lightweight Digital Tactical Operations Center (LDTOC)	not funded for development or procurement
Monocular Night Vision Device (MNVD)	not funded for procurement
Medium Machinegun Upgrade (MMU)	procurement of the MMU is currently unfunded
Line of Sight-Antitank (LOSAT)	not funded for Development
Lightweight Mortar System (LMS)	not funded for development or procurement
Lightweight Laser Designator Rangefinder (LLDR)	not funded for development or procurement
High Mobility Artillery Rocket System (HIMARS)	procurement will not begin in FY 05
Launched Grapnel Hook (LGH)	no procurement funds
Small Projected Line Charge (SAPLIC)	not currently funded
Fighting Position Excavator (FPE)	No production funds
Soldier Fighting Cover (SFC)	No procurement funds are currently allocated

Figure C-11

Figure C-12 groups Light Force programs into major categories and compares them to the warfighting concepts of Section 2 over time.

LIGHT FORCE PROGRAM ASSESSMENT

	WARFIGHTING CONCEPTS	NEAR-TERM FY95-96	MID-TERM FY97-00	FAR-TERM FY01-09
DIGITIZATION	•INTEGRATION OF WEAPONS, SYSTEMS, SOLDIERS •HORIZONTAL DIGITIZATION •FORCE XXI - BATTLE COMMAND	AMBER	AMBER	AMBER
FIREPOWER	•DIGITIZED SENSOR-TO-SHOOTER LINKAGES •PRECISION FIREPOWER •REDUCED COLLATERAL DAMAGE •INCREASED LETHALITY •MULTI-PURPOSE WEAPONS	AMBER	AMBER	AMBER
MOBILITY and MANEUVER	•LIGHTWEIGHT MATERIALS •TERRAIN/OBSTACLE REDUCTION •INCREASED RESUPPLY TEMPO	AMBER	GREEN	GREEN
LEADERSHIP and TRAINING	•DISTRIBUTED, VIRTUAL SIMULATIONS •MISSION PLANNING •EFFECTIVE NEW EQUIPMENT TRAINING	AMBER	AMBER	AMBER
PROTECTION	•UNMANNED RECONNAISSANCE •OVER-THE-HILL SURVEILLANCE •HIGH RESOLUTION VIDEO CAPTURE •FORWARD LOOKING INFRARED RADAR •REDUCED EXPOSURE	RED	AMBER	AMBER

Figure C-12

SECTION 4

RESEARCH, DEVELOPMENT & ACQUISITION STRATEGY

The Combat-Light Modernization RD&A strategy focuses on the warfighter. The lethality and survivability of the Light Force warfighter continues to be the main focus, but strategy also looks to capabilities that enable Light Forces to strike deeper. This strategy assures the greatest value added given a constrained budget. The Modernization Strategy for Light Forces is **balanced and coordinated**; little benefit is gained by great strides in lethality, if survivability and protection go severely unfunded.

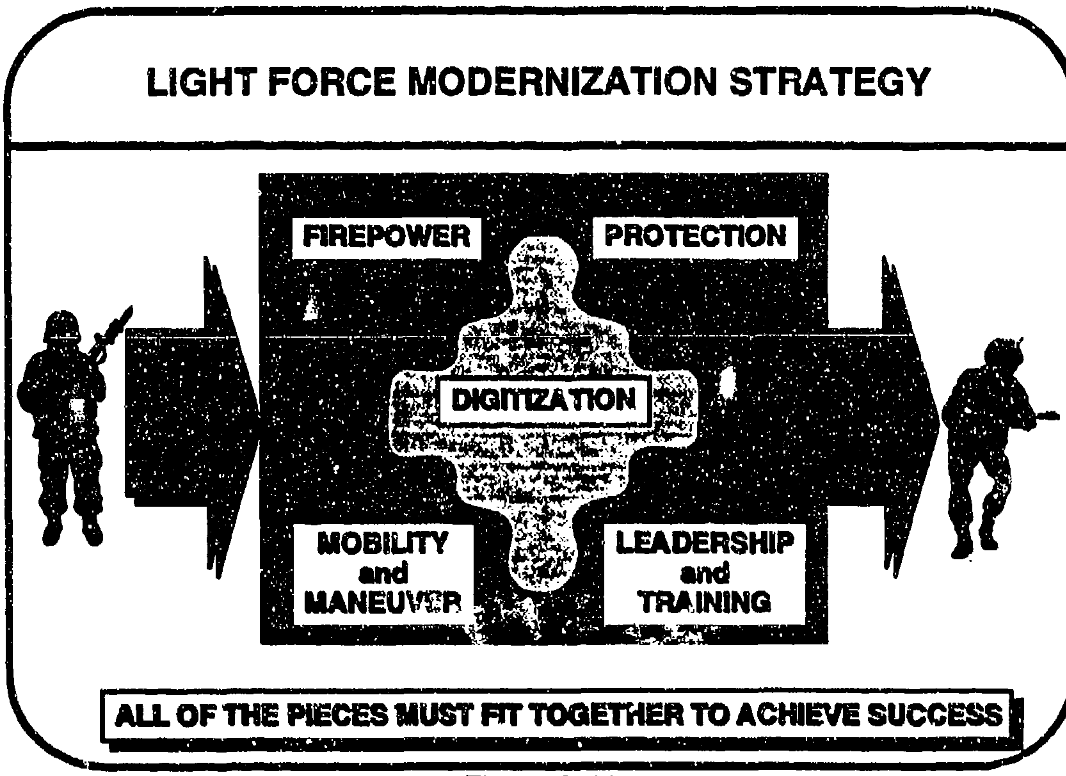


Figure C-13

The use of several Advanced Technology Demonstrations and Advanced Warfighting Experiments (AWEs) allows the Light Force to keep pace with evolutions in technologies. By linking Tech Base efforts to near-term operational requirements, we sustain today's capability while wisely investing in the future. Horizontal Technology Integration is used to modernize across the force quickly at the least cost. Several high pay-off systems are to be selected for operational prototyping; this rapidly fields small numbers of high-leverage systems.

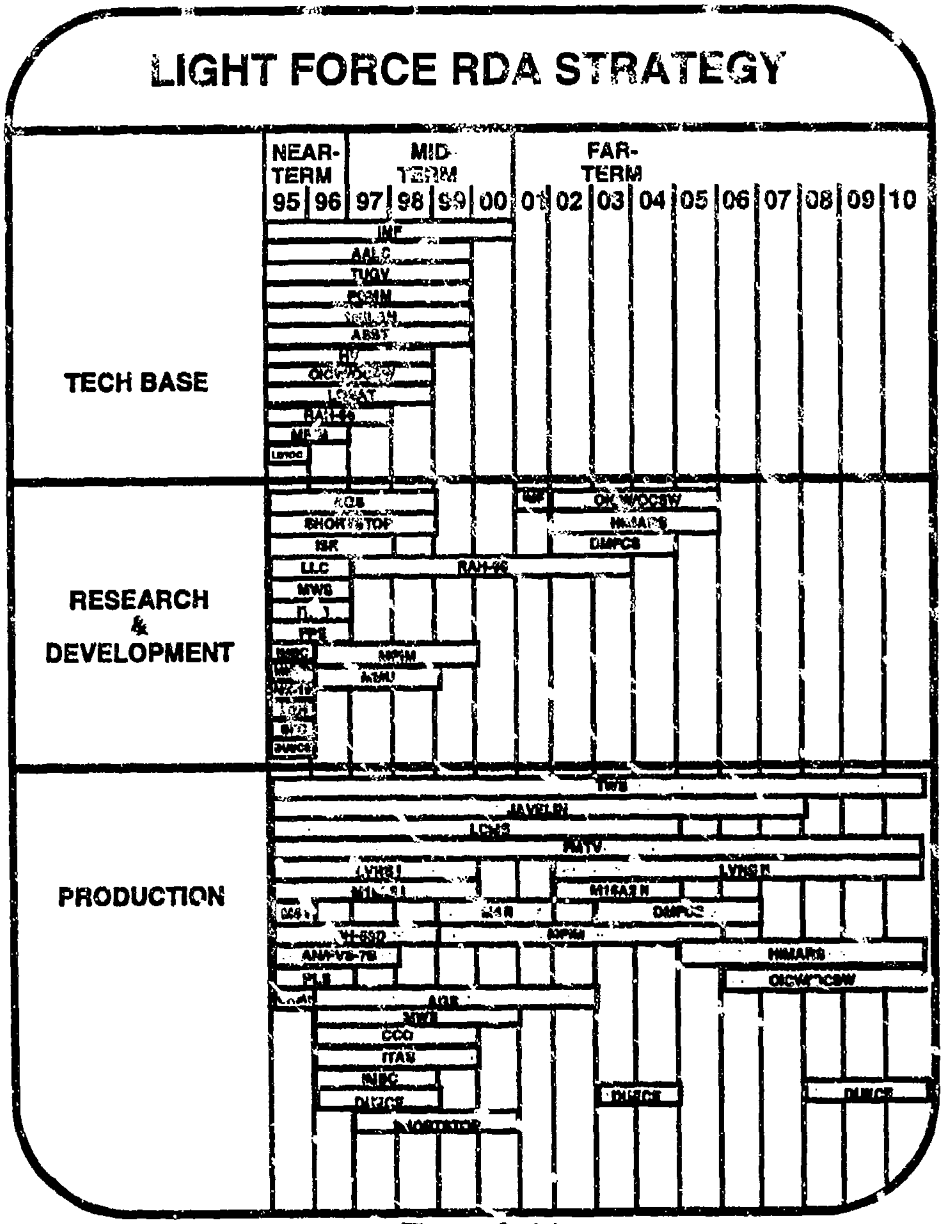


Figure C-14

A prime example of this tech base strategy is the Rapid Force Projection Initiative (RFPI). The RFPI explores new tactics and technologies using a system of systems approach to provide a path to an air deployable, early entry Light Force that is significantly more capable against a heavy armored threat. The RFPI concept includes a variety of advanced sensors (air and ground, manned and unmanned); several precision guided munitions, responsive command and control; and, automated targeting. Specifically, the Advanced

Concept Technology Demonstration (ACTD) provides the developer, TRADOC (Dismounted Battle Space Battle Laboratory), the CINCs, and Forces Command (XVIII Airborne Corps) opportunities to explore the integration of new technologies and modified tactics, techniques and procedures to improve the survivability of our early entry forces. It features the demonstration of a highly lethal, survivable, and rapidly air deployable system of systems in a large scale field exercise (within an air weight/volume constrained environment).

The Way Ahead

There are several potential improvements to current Light Force modernization programs. These suggestions fix issues highlighted in Section 3. Affordability, return on investment, and reduced programmatic risk were the basis for selecting these solutions.

Digitization

The highest priority in modernizing the Light Force is in the area of Digitization. Beginning with the development of the Digitized Mortar Fire Control System (DMFCS) in FY 96 plus procurement of the Lightweight Leader Computer (LLC) and Individual Soldier Radio (ISR) as soon as they complete type classification in FY 96 and FY 97 respectively will achieve this goal. Mortars will be able to operate in a semi-autonomous role, providing more accurate fires in half the time now required. The LLC and ISR will greatly increase communication and control in small unit operations, thereby enhancing the soldier's situational awareness and reducing the potential of fratricide.

Firepower

Within the Firepower area resourcing procurement of the Medium Machine-Gun Upgrade (MMU) and initiating development of Precision Guided Mortar Munitions (PGMM) and the Lightweight Mortar System (LMS) offer the best return on investment. All three fixes can be initiated in the mid-term (FY 97-00). Fielding PGMM, fired from a LMS that is digitized with DMFCS, represents a revolutionary leap in mortar capabilities for Light Forces. The Army's current medium machine guns, the 7.62mm M60, are wearing out and need replacement.

Mobility and Maneuver

Procuring sufficient war stocks of the Launched Grapnel Hook (LGH) and Small Projected Line Charge (SAPLIC) will give Light Forces additional and needed capabilities to reduce and negotiate minefields and terrain obstacles. Speeding the Tech Base development of the Advanced Airdrop for Land Combat (AALC) program will eventually speed the resupply tempo of Light Forces, as well as provide a more protected means of accurately delivering air-dropped cargo in hostile environments.

Protection

Both the Fighting Position Excavator (FPE) and Soldier Fighting Cover (SFC) will be type classified by the end of FY 96 and become ready for procurement. Procuring sufficient war stocks of both systems will give combat, combat support, and service support added protection from indirect fires, which is the major killer on the battlefield.

Summary

Figure C-15 is a summary of the key systems that can be fixed in a timely and cost-efficient manner. These fixes are presented as a package that will have a significant beneficial impact on all Light Forces.

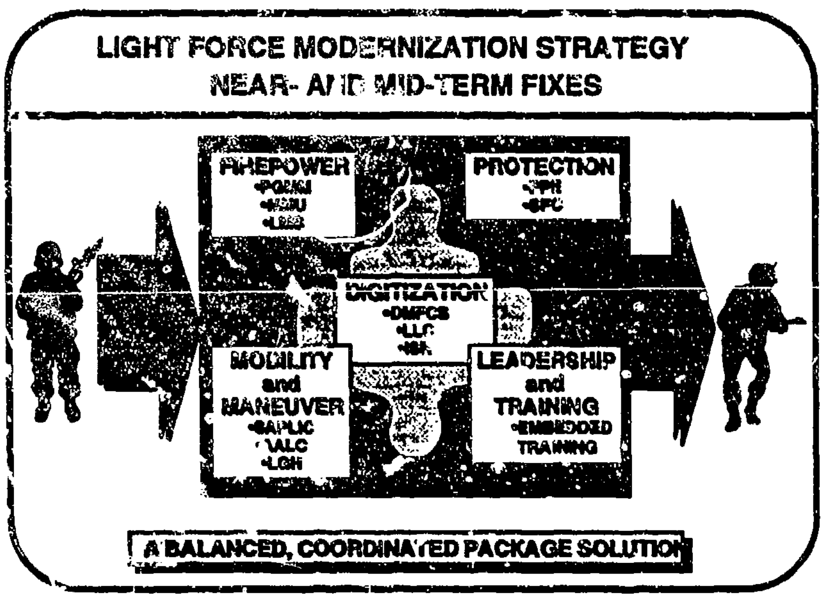


Figure C-15

SECTION 5

TRAINING

"It cannot be too often repeated that in modern war..., the chief factor in achieving triumph is what has been done in the way of thorough preparation and training before the beginning of war."
Theodore Roosevelt
Graduation Address
US Naval Academy
June, 1902

Training Strategy

A quality Light Force starts with competent commanders and noncommissioned officer leaders who have developed an intuitive sense of battle gained from study and expertise. Training remains the key to modern, combat-ready Light Forces. Effective modernization and sustained high levels of operational readiness of Light Forces are inexorably linked to rigorous, constant, and realistic training.

The failure to support modernization with appropriate training is equivalent to not fielding the supported system. If Light Forces are not trained to employ effectively modernized equipment, in essence, the new equipment does not exist.

Just as Light Forces modernize, training resources, methods, and strategies must be updated so that the Army can attain the operational warfighting concepts set forth in Force XXI. Through the Force XXI process, Light Forces gain additional data to analyze and develop solutions for many training issues. Units which participate in AWEs will provide test beds in a field environment with actual soldiers, leaders, and equipment to explore new techniques; together, these increase the return on Light Force modernization. Key events, such as LAM and AWEs, focus and integrate Light Force efforts to modernize training.

Commanders and small unit leaders remain the principal instructors, ensuring a wartime mission focus. Tough, realistic combined arms and joint collective training are the ultimate challenges. The supporting training strategy emphasizes force projection, contingency operations, and OOTW.

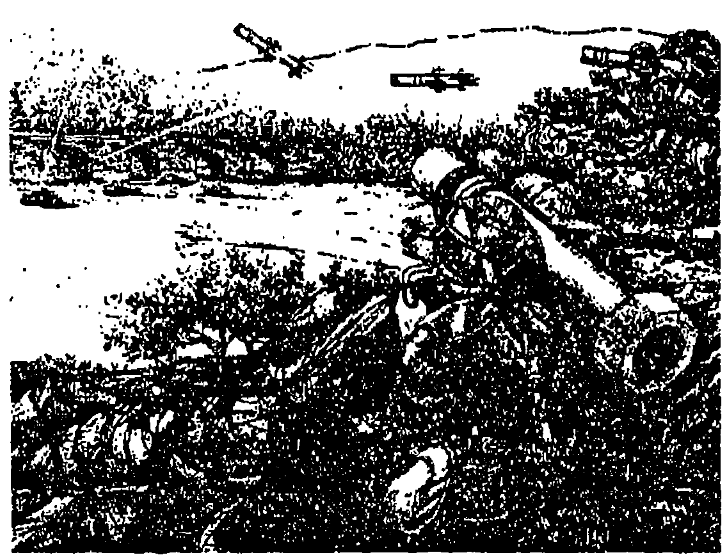
Training of leaders in Light Forces is the main effort. To this end, TRADOC is giving leader training the highest priority. Leader courses are to be fully resourced and will keep pace with modernization. Light Force soldiers are to undergo institutional and unit training that prepares them technically and psychologically for combat.

Training Aids, Devices, Simulators and Simulations (TADSS)

Light Forces training is supported by the Combined Arms Training Strategy (CATS). CATS is a descriptive notional annual training program integrating combinations of full-scale live-fire training exercises, augmented and reinforced through the use of visual aids, devices, simulators and simulations. This strategy maximizes the training value of deployments to the Army's Combat Training Centers (CTC). The CTC experience emphasizes combined arms and joint integration while executing likely missions against a professional, well-trained, free play OPFOR.

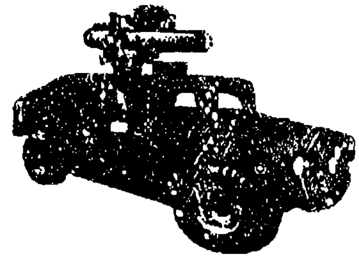
Javelin. The Javelin is to be fielded with three training devices.

- The **Basic Skills Trainer** (BST) trains basic and advanced Javelin gunnery skills. It satisfies the need for a reliable and accurate means of training gunners without requiring live fire. It is to be used at institution level for gunner training and qualification. At unit level, it is to be used quarterly for sustainment training and verification of gunner qualification.

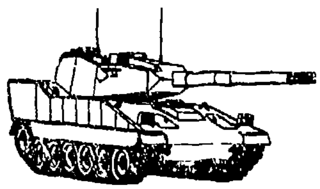


- The **Field Handling Trainer** (FHT) consists of a Simulated Missile Round (SMR) and a tactical Command Launch Unit (CLU). The SMR is a dummy missile of the same weight and size of an actual missile. The FHT is a procedural trainer for assembly/disassembly training and for carrying by the gunner in lieu of the more expensive Field Tactical Trainer (FTT) during field training exercises.

The **Field Tactical Trainer** (FTT) consists of an SMR and an Instructor Station (IS), and is used for gunnery and tactical training. The FTT incorporates the actual Javelin CLU as an integral component. The FTT interfaces with the Multiple Integrated Laser Effects System (MILES); together, they are used in tactical training exercises and during squad/platoon qualification on multi-purpose range complexes.



Improved TOW Acquisition System (ITAS). The ITAS program includes a software-based embedded trainer. The operational acquisition sighting system will have the capacity to perform either its tactical mission or embedded training based on the software program applied. The embedded trainer is used to train all skills and tasks necessary to operate and employ the ITAS; it provides tutorials, demonstration/orientation, guided practice, evaluation, feedback, as well as networking with other ITAS systems.



Armored Gun System, M8 (AGS). The AGS is to be fielded with the **Advanced Gunnery Training System** (AGTS). The AGTS, which is an evolutionary refinement of past Conduct of Fire Trainers fielded with the Bradley Fighting Vehicle and Abrams tank, replicates the turret and driver compartments of the AGS. This high fidelity training simulator incorporates state-of-the-art computer generated imagery. Each battalion with the AGS will receive one AGTS. The AGTS is to be air transportable and can be linked with other AGTS. The AGTS functions include tactical maneuver and gunnery training.

Rapid Force Deployment Initiative (RFDI). Networking computers among Branch Schools and Light Forces in the field allow soldiers and leaders access to up-to-date doctrine and subject matter expertise. Embedded training devices in new equipment allow soldiers to train on actual equipment while deployed away from training resources. Simulations used in Command Post Exercises (CPX) are to more accurately replicate the consequences of command decisions. Currently being designed in the Tech Base RFPI, these simulations use smaller, cheaper computers permitting increased training opportunities at a reduced cost. Commanders use such CPX tools to conduct valid mission analysis, course of action development, planning, and rehearsals.

Conclusion

The Light Force training strategy encompasses multiple training means to develop a cohesive joint and combined arms fighting unit. Institutional training at all Army schools, unit, individual and collective training, correspondence courses, system training devices, and other TADSS combine to form an integrated and cooperative training strategy. Each part has a function that is supplemented and complemented by others parts.

Information about Army-wide training initiatives and issues, and detailed explanations of fielding and funding status, are found in Annex R (Training).

SECTION 6

CONCLUSION

Light Forces must use technology wisely to become more lethal, survivable, deployable, and versatile. Additionally, Light Forces must possess greater endurance in the areas of influence and versatility. Victory in war will go to the force able to string together a series of tactical victories faster than the enemy can respond. Light Forces can defeat a larger, heavier and less agile force quickly and decisively by:

- Massing effects of long- and short-range area and precision fires;

- Integrating superior situational awareness with information warfare operations designed to blind, deafen and demoralize the enemy; and,

- Concurrent and rapid combined arms maneuver.

Soldiers represent this Nation's sincerest expression of commitment and will. In 1994, for the first time in our Nation's history, American soldiers deployed to a variety of countries almost every day. The majority were Light Forces soldiers. As we enter the 21st Century, we must ensure we modernize our Light Forces in an appropriate and responsible manner. Those who are called upon to fight must possess the best tools to accomplish their mission with minimal casualties.

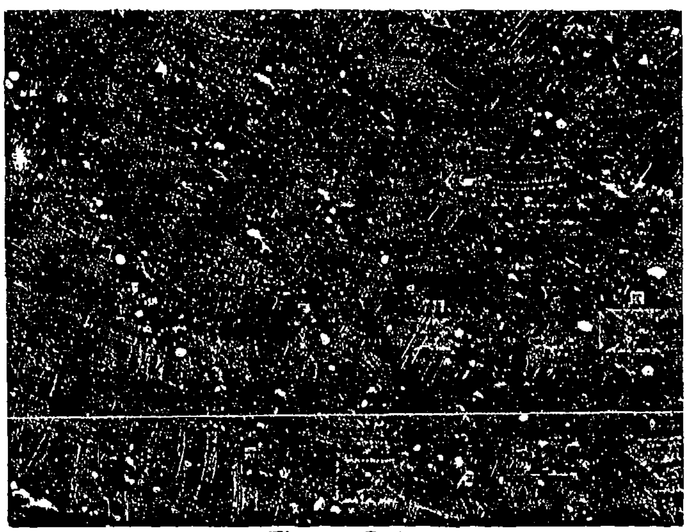


Figure C-16

ANNEX D

HORIZONTAL TECHNOLOGY INTEGRATION

ANNEX D

HORIZONTAL TECHNOLOGY INTEGRATION

SECTION 1

INTRODUCTION

Army modernization is facing formidable challenges; technology offers significant operational advantages, but all come at high cost, and not all are successful. When technological breakthroughs occur, the Army must capitalize upon them and distribute the advantages across the force. Horizontal Technology Integration (HTI) is one of the Army's new enabling strategies. It applies emerging technologies commonly across multiple systems to improve the warfighting capability of the total force; it simultaneously integrates and fields such technologies into different weapon systems and support platforms that fight together, providing exponential improvements to the force. "Pushing" Army emerging technologies across the range of systems also enhances interoperability. This affords economies of scale by capitalizing on opportunities to modernize where opportunities may not have been considered earlier.

HTI breaks away from traditional and expensive vertical technology integration or stovepipe requirements and materiel acquisition processes. Past modernization programs often produced systems with mission specific capabilities for combat, combat support, and combat service support purposes with little regard for the other systems. HTI incorporates dissimilar systems (e.g., armored vehicles, aircraft, support platforms, and command and control vehicles) with common technology through new acquisitions, Preplanned Product Improvements (P3I), and system component upgrades. Fielding common subsystems reduces operational and support costs by allowing standardization of components, simplified maintenance, and more efficient use of manpower by concentrating critical operator and supporter skills.

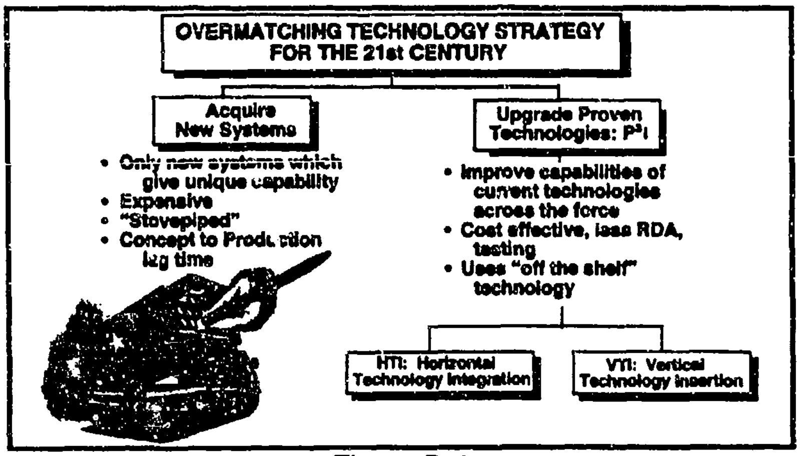


Figure D-1

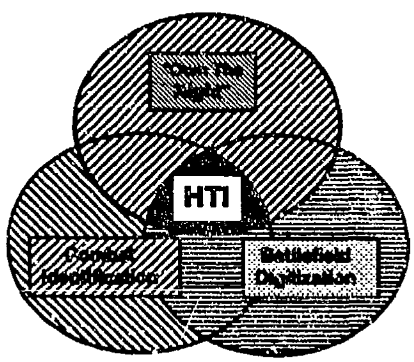
HTI can assure the versatility of the Army into the 21st Century (Force XXI) just as the "Big 5" weapon systems (M1, AH-64 Apache, UH-60 Blackhawk, Bradley Fighting Vehicle, and PATRIOT) comprised the Army's modernization framework to execute AirLand Battle doctrine of the 1980's. As a process, HTI supports an integrated battlefield architecture. HTI allows weapon systems such as the M1A2, M2/3A3, AH-64C/D, OH-58D, and others, to acquire and engage threats while sharing the same information with equal clarity, using advanced technologies and digital communications.

IMPLEMENTING HTI

HTI is implemented within the framework of existing structures and organizations. The process complies with the evolving streamlined acquisition process being developed by DoD. The HQDA General Officer Working Group (GOWG) for HTI is co-chaired by the ADCSOPS-FD and ASA(RDA) Deputy for Systems Management. The GOWG establishes the HTI blueprint, sets priorities, and provides implementation guidance. Furthermore, the Deputy for Systems Management determines, coordinates, and issues specific guidance for HTI programs implemented across multiple Program Executive Office(PEO)/Project Manager (PM) organizations. The intent of HTI is to break old paradigms and strive for organizational reform, by subscribing to Commercial Off-the-Shelf (COTS) and Non-Developmental Item (NDI) solutions.

HTI ENHANCEMENTS

HTI is currently exploiting and applying technologies to three areas which will enhance the capabilities and survivability of soldiers:



LEAP AHEAD AT THE COMPONENT LEVEL

Figure D-2

"Own the Night": Our forces must have capabilities which permit them to achieve tactical surprise and maintain momentum round-the-clock. Second Generation

Forward Looking Infrared (2nd Gen FLIR) is one technology that allows this. It can be inserted in aircraft, armored vehicles, and command and control vehicles.

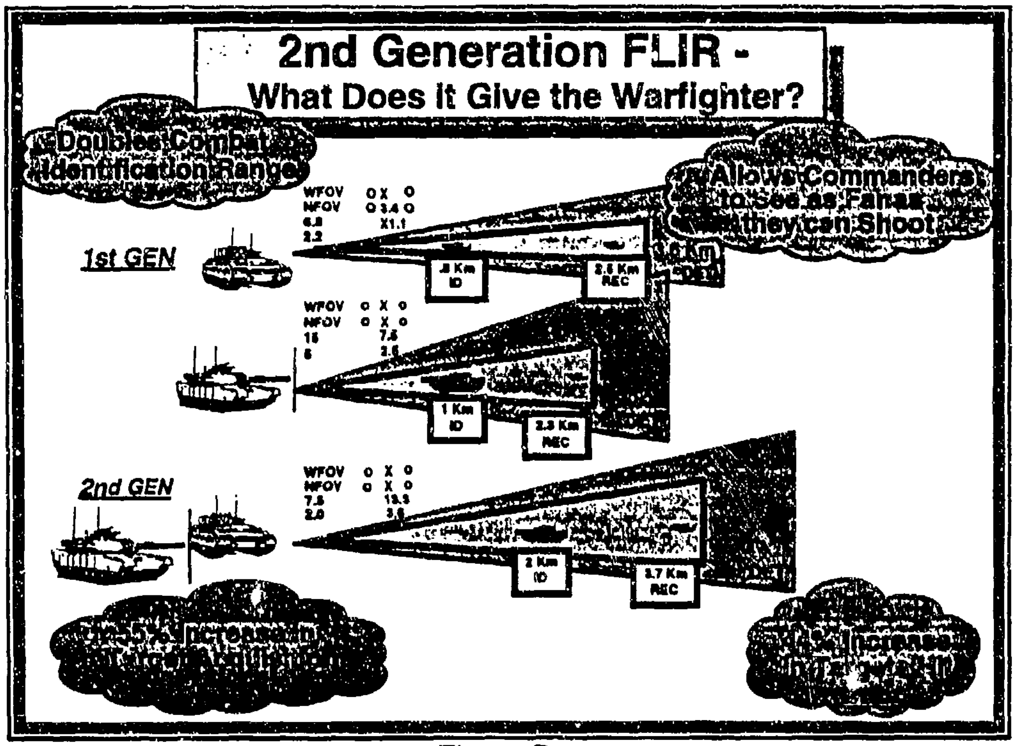
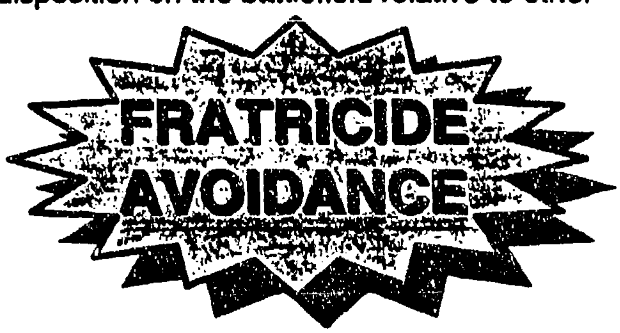


Figure D-3

Second Generation FLIR provides a wider field of view and a much improved resolution which means increased combat identification ranges and more accurate target detection. Additionally, image intensification (I2) devices and magnifiers applied to night vision goggles (such as the AN/PVS-7B, a lightweight, monocular goggle used by individual soldiers) improve our capability to "own the night," and can reduce fratricide.

Battlefield Combat Identification: Like improved target identification, enhanced situational awareness also reduces the risk of fratricide. As it relates to combat identification, situational awareness is a condition in which warfighters have the capability to know their location and disposition on the battlefield relative to other combatants, both friendly and enemy. Battlefield combat identification technologies permit the warfighter to distinguish between friend and foe throughout the target engagement process. Currently, Millimeter Wave (MMW) technology provides the basis for near-term ground to ground and air



to ground solutions to combat identification via an interrogator transponder. The Army effort for the future builds on this effort, integrates target identification and situational awareness, and extends it to dismounted soldiers.

Battlefield Synchronization at Brigade and Below Digitization: The rapid exchange of information via high speed digital networks and data transfer systems is an absolute requirement of Army modernization. Simply stated, getting the right information to the right warfighter at the right time is a matter of utmost necessity.

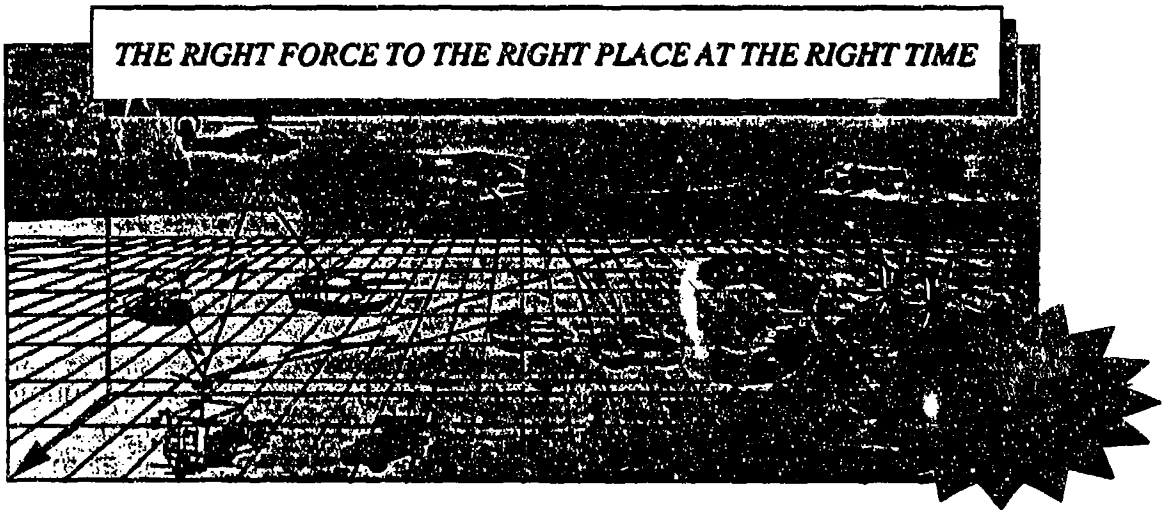
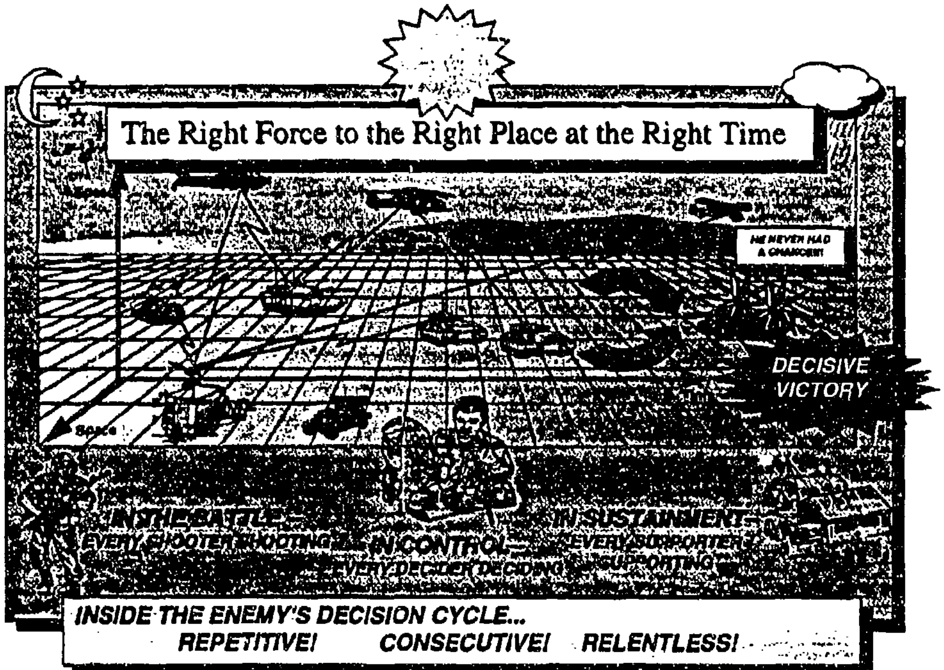


Figure D-4

Software plays a major role in this effort as it can provide total situational awareness to maneuver and support commanders. By having immediate access to pertinent information, all combat, combat support, and combat service support units can anticipate requirements and synchronize actions needed for mutual support and ultimate mission accomplishment. The Brigade and Below Command and Control (B2C2) operating system is the current baseline of this concept; it is to be enhanced through the digitization effort. An open systems architecture is being adopted; it makes maximum **practical** use of commercial standards, consistent with DoD direction and requirements for digitization. The development of standard interface and common protocol data exchange formats to manage large amounts of shared data are essential and are now underway. Digitization enables sharing of unprecedented quantities of information throughout the battlefield over the relatively narrow bandwidths of tactical radios.



•CONTROL THE BATTLESPACE •CONTROL THE TEMPO •CONTROL THE ENVIRONMENT

TOTAL SYNCHRONIZATION THRU DIGITIZATION

Figure D-5

The Integrated Battlefield Architecture (IBA) Special Task Force produced a targeting architecture (Figure D-5) which integrates maneuver control, fire support, IEW, and communications. It gives the Army a significant advantage in the development of several targeting initiatives, and ensures sensor to shooter timelines are reduced significantly. IBA initiatives also influence joint doctrine development. The communications community is recommending Transmission Control Protocol/Internet Protocol (TCP/IP) for the seamless connectivity required by the digitization process. The TCP/IP protocol suite is the de-facto networking standard for both industry and DoD applications. It is now the most widely used form of networking between computers. This protocol allows a range of common services, such as file transfer and electronic mail, to be supported over a range of different networks. It offers seamless connectivity by permitting a user to send data to any other user, regardless of the destination platform type, or location.

Seamless connectivity also permits display of a common picture of the battle area for the entire warfighting team, thus promoting and greatly enhancing the synergism of the total force. Combat, combat support, and combat service support commanders can make informed decisions based on accurate real time or near real time information. Maneuver commanders at all levels can thus apply appropriate forces at appropriate places at appropriate times. Combat support commanders can view digitally displayed maneuver control measures and begin immediate planning for indirect fire support, combat engineer support, and air defense artillery support.

Combat Service Support commanders can use automated, accurate logistics information to anticipate early and calculate finitely the requirements for fuel, ammunition, repair parts, and maintenance needs of all forces.

The product of digitization means every shooter will be shooting, every decider will be deciding, and every support element will be supporting more accurately with greater effectiveness. The result can be Decisive Victory, sooner.

"...The Cold War acquisition system...served us well, but it is inappropriate to the current threat, technological, and resource environments. It is a very linear system of discrete little boxes. What we now require is a nonlinear system--a system of connectivity, not boxes."
General Gordon R. Sullivan
Army Chief of Staff

SECTION 2

WARFIGHTING CONCEPT

"MISSION: The US Army designs the 21st Century force (FORCE XXI) beginning now to achieve related fielding and support decisions by the year 2000 in order to fully field the total Army force that is capable of meeting our Nation's 21st Century challenges...from foxhole to factory and front to rear."
Force XXI Campaign Plan

The Army is a doctrinally based force. This means that all our efforts--training, organizing, and equipping the force--are guided by a doctrine which tells us how to think about the conduct of military operations. On 14 June 1993, the Army Chief of Staff released the updated version of our keystone doctrine, *Field Manual 100-5, Operations*. The manual states that doctrine derives from a variety of sources, including technology, and that the Army of the future must be versatile; it must be capable of operating across the full range of military operations, from combat to noncombatant operations (e.g., peacekeeping, humanitarian assistance). Versatility requires increased, quicker, and more accurate information sharing, more rapid decision-making, and increased synergism, on the battlefield and in operations Other Than War (OOTW). "Our success," asserts the Force XXI Campaign Plan, "depends on our ability to mentally adapt to the information age and to integrate it in a timely manner with high payoff technological advances." Horizontal Technology Integration (HTI) helps us respond efficiently and cost effectively to those demands.

Evolution of the Battlefield Framework

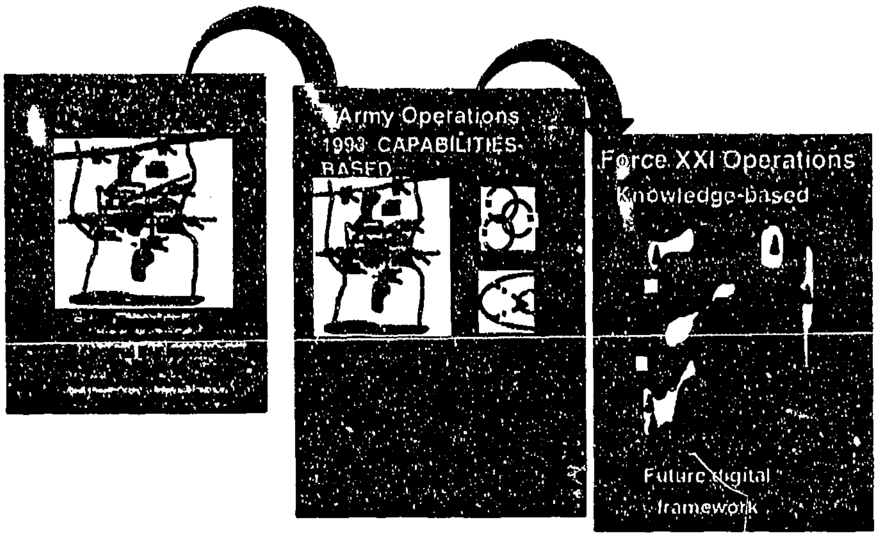


Figure D-6

TRADOC Pamphlet 525-5, Force XXI Operations, specifies that the digitized Army must be prepared to face the full range of operational environments. Thus, the

Army must design organizations and develop capabilities that allow it to be rapidly tailored, rapidly expanded, strategically deployed, and operate effectively as an independent force, or as part of joint or multinational efforts to achieve decisive results in all operational environments. Force XXI is defined by five design principles: doctrinal flexibility, strategic mobility, tailorability and modularity, joint and multinational connectivity, and the versatility to function in war and OOTW.

In pursuit of its responsibility for Land Force Dominance, the Army has seen the importance of and the possibilities offered by, current and emerging technologies which can integrate the battlefield. The integrated battlefield is created by employing technologies across systems vice into single systems. The concept of Land Force Dominance, requires technology and systems which: Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle. Our modernization efforts focus on these objectives. Specific technologies (e.g., digitization, battlefield combat identification, and 2d Generation FLIR), integrated horizontally across systems, support the entire force by single systems.

A key factor in modern warfare and OOTW, is the ability to collect, process, disseminate and use information about the enemy while preventing him from obtaining similar information about our forces.

The force must destroy, disrupt, and control enemy information sources while ensuring that commanders get accurate and relevant data in time to use it. Digitizing the battlefield systems (e.g., equipping them to transmit, receive and display digital data) is fundamental to Winning the Information War.

Digital data networks allow rapid sorting and sharing of critical information throughout the battlefield. This technology allows the commander to see the battle through the sensors of his reconnaissance helicopters, scouts, tanks and direct fire systems, and better coordinate his forces by sharing his view of the battlefield and his objectives with these same tanks, fighting vehicles, artillery, command centers, attack and reconnaissance helicopters.

PROTECT THE FORCE

The Battlefield Combat Identification System supports future warfighting efforts by providing an effective and survivable ground to ground and air to ground (rotary wing) capability to enhance combat effectiveness and to reduce fratricide. BCIS is directly linked with the Army's current plans to digitize the battlefield and will demonstrate contribution for enhancing situational awareness as part of the Force XXI modernization effort.

DOMINATE THE MANEUVER BATTLE AND CONDUCT PRECISION STRIKE

A CONUS-based, force projection Army will be required to conduct high tempo operations around-the-clock, over extended ranges. Forces need an environment in which all friendly elements share a relevant, common picture of the battlefield, can communicate over high speed data links, and can target in real or near real time. One of the Army's key objectives in creating this environment is to "own the night." Integration of 2d Generation FLIR technology on a number of existing platforms and those systems in development will provide for Dominance of the Maneuver Battle especially at night and during periods of reduced visibility. By using a common thermal 2d Generation sensor integrated in various platforms, the warfighter will have an enormous advantage over any potential adversary capability. This advanced observation and target acquisition capability will provide a maneuver edge for our warfighters well into the next century. Precision Strike by direct fire weapon systems will also be enhanced by a combination of 2d Generation FLIR, battlefield combat identification systems, and digital communications. The synergistic effects of these systems will allow the warfighter to see, acquire, identify and engage threat forces with much greater precision than afforded by our current capabilities. The ability to rapidly communicate the commander's intent and use the inherent flexibility afforded by digital communications will permit maneuver forces to generate and maintain the initiative on the battlefield while operating in an environment of greater situational awareness.

"Force XXI will control the power of information and technology and incorporate unprecedented battle command capabilities in order to ensure a more lethal, more mobile, and more survivable fighting force by exploiting the Army's modernization focus."
Force XXI Campaign Plan

SECTION 3

CURRENT PROGRAM ASSESSMENT

Program assessments are signified as:

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and

GREEN -- Adequate capability and quantity exists to perform the mission.

SECOND GENERATION FORWARD LOOKING INFRARED (2d Gen FLIR)

The objective of this program is to develop, select, and field a greatly increased capability to fight during periods of reduced visibility. The 2d Gen FLIR promises to provide better resolution and increased clarity at greater ranges and lower cost than existing systems. Current FLIR systems have effective ranges far less than the maximum effective range of the weapon systems with which they are associated.

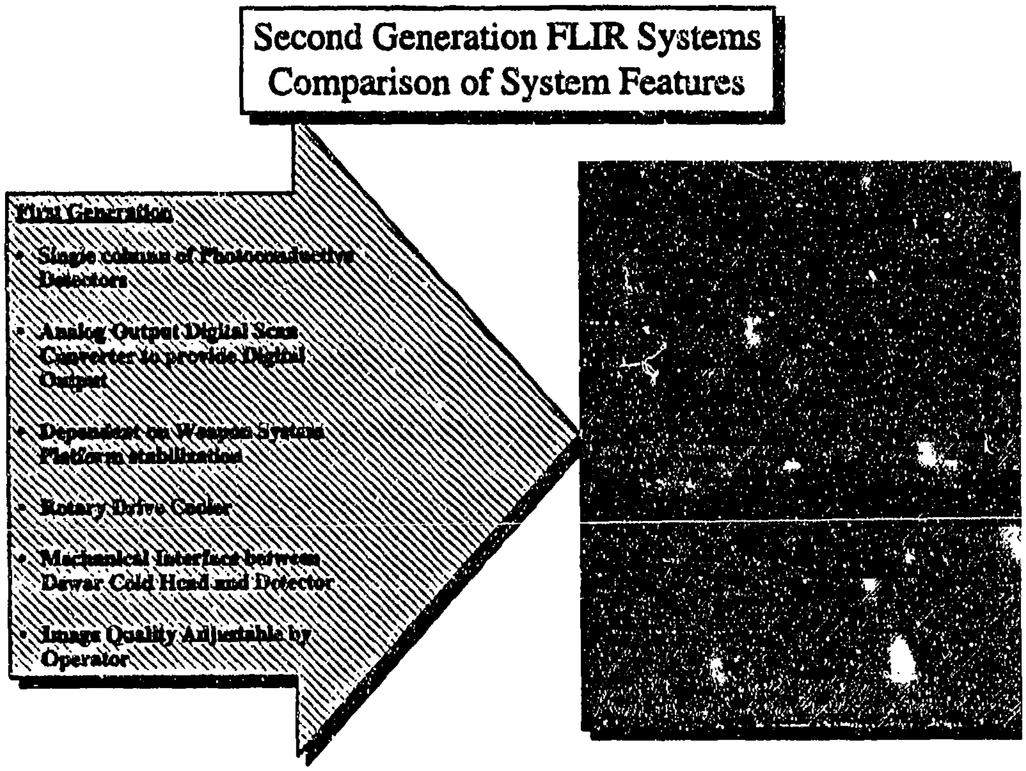


Figure D-7

2d Gen FLIR technology provides significant improvements over 1st Gen FLIR systems in reliability, maintainability, image quality, range detection, recognition, and identification capability. Unlike 1st Gen FLIR, 2d Gen FLIR has a digital output capability.

The 2d Gen FLIR will be applied to the Bradley Fighting Vehicle, Armored Gun System, M1A2 Abrams, Aviation platforms and the Long-Range Advanced Scout Surveillance System (LRAS3). Due to its wide application, significant economies of scale are anticipated, as are substantial cost savings. Adding 2d Gen FLIR to these platforms is expected to pay warfighting dividends shown here:

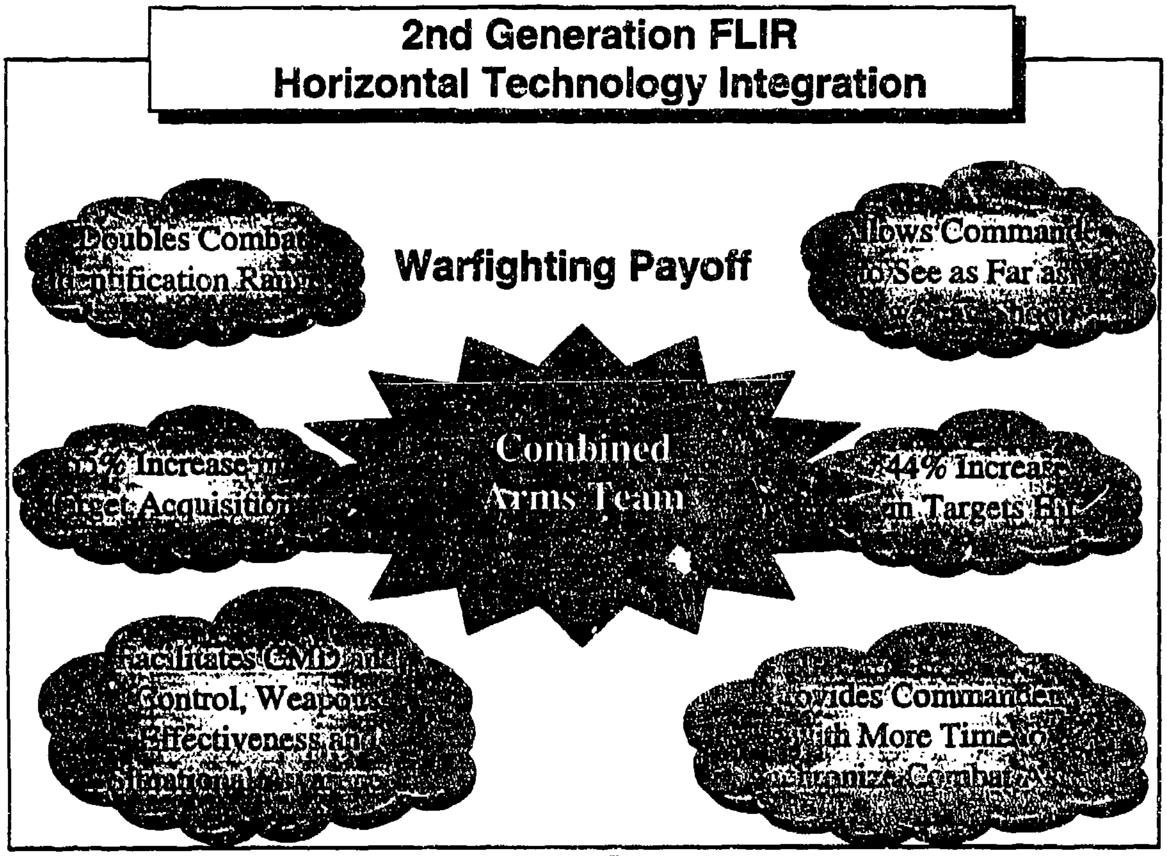


Figure D-8

Doubling combat identification ranges through increased electro-optic resolution allows shooters to effectively identify and engage enemy targets to the maximum effective range of the weapon system. Further, the finer resolution offered by 2d Gen FLIR, will visually aid battlefield combat identification and thus reduce fratricide. The maneuver control process and situational awareness challenges under all environmental conditions will be eased by our ability to "own the night."

The current schedule for integration of 2d Gen FLIR on respective platforms is shown in Figure D-9:

Integrated Program Schedule

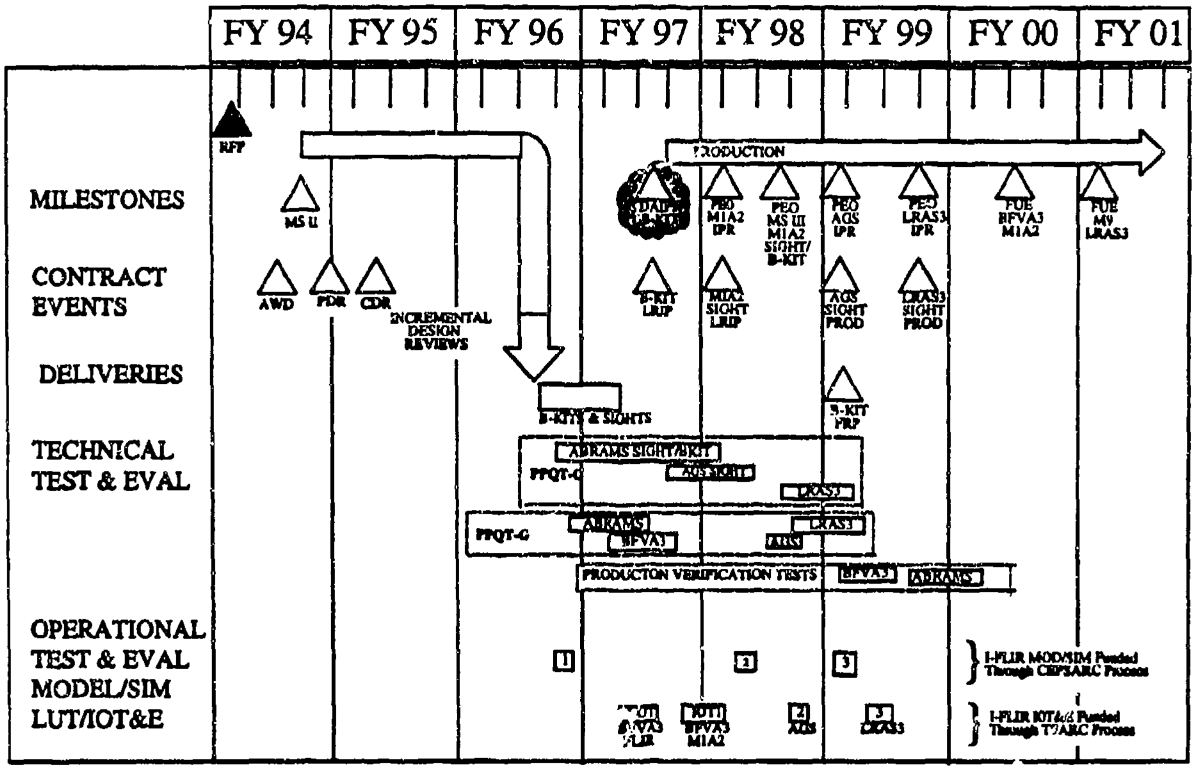


Figure D-9

The 2d Gen FLIR is programmatically complex as it affects many projects in the Program Executive Officer-Armored Systems Modernization and Program Executive Officer-Intelligence and Electronic Warfare areas of responsibility. It is expected that PEO-AVN will be involved in future plans for the application of this system to respective air platforms. Given the complete cooperation between the various PEOs and PMs, this program is a classic example of Horizontal Technology Integration. The current program is rated **GREEN.**

BATTLEFIELD COMBAT IDENTIFICATION

The objective of this program is to develop, select, and demonstrate technologies that increase combat effectiveness and minimize fratricide during ground to ground and air to ground engagements and to demonstrate integration of battlefield target identification and situational awareness information in the overall joint battlefield architecture.

After Operation Desert Storm, the first materiel response to fratricide brought on "quick fix" devices. Subsequently, a joint task force recommended the adoption of a three-phased acquisition program that divided the combat identification project into near-, mid-, and far-term product efforts. Near-term combat identification product development resulted in the selection of the Battlefield combat identification System (BCIS), a millimeter wave question and answer technology, for use in preproduction experimentation and testing. The mid- and far-term product phases have been merged into one acquisition effort called the Battlefield combat identification Advanced Technology Demonstration, or BCID ATD.

Quick Fix

As an immediate solution to the complex fratricide problem and combat identification challenge, the Army developed and fielded a quick fix combat identification package of infrared visible devices called Budd lights, thermal ID panels and Global Positioning Systems (GPS). Since these devices can be exploited and are unreliable in certain tactical environments, the Army is pursuing other technology solutions to reduce fratricide.

Quick Fix Fielding Schedule
CONUS Contingency Force and Eighth US Army

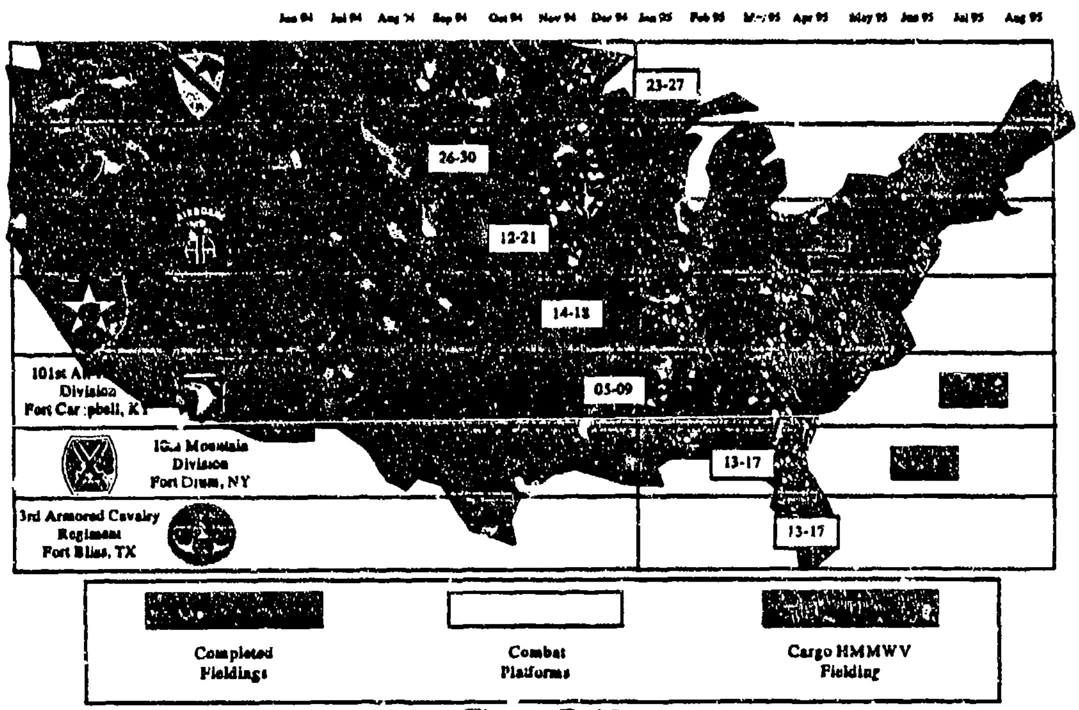


Figure D-10

BCIS

BCIS is a question and answer system comprised of interrogating and transponding components. Target identification is performed by platforms that have a direct fire capability and those which are instrumental in initiating indirect fire missions. The system operates by transmitting an interrogating Millimeter Wave (MMW) signal toward suspected targets. Friendly platforms equipped with a transponding component respond to a "friend" identifier, otherwise the platform is classified unknown.

BCIS is to be installed and integrated with selected Army/Marine Corps ground and rotary winged platforms. The Army is exploring the potential capability of BCIS to act as a short range digital data link; it could provide more comprehensive and timely situation awareness coverage. Included in this effort is the demonstration of BCIS capability to display friendly locations and identifications on the digital Appliqué sets currently being procured by the Army.

The current BCIS effort has potential on these ground systems:

M1A1/A2 Abrams	M728 CEV	M113A3 APC
M2A2 Bradley	AVLB (M60)	M9 ACE
M3A2 Bradley	M109A6 Paladin	M1064 Mortar
HMMWV Scout	M992 FAASV	M93 Fox, NBC veh
M577 CPV	MLRS	LAV
M981 FISTV	Avenger	

Figure D-11 chart displays the current program schedule.

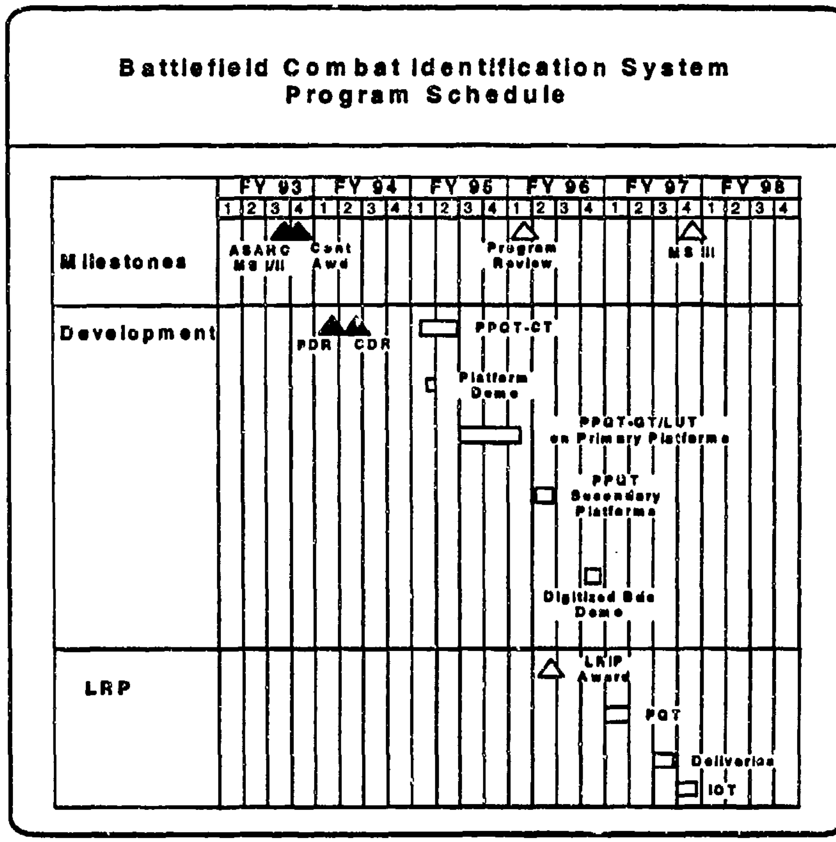


Figure D-11

Program Assessment:

Near-term: **GREEN** Mid-term: **GREEN** Far-term: **AMBER**

The program is rated **AMBER** in the far-term because there are no procurement funds beyond a small Low Rate Initial Production (LRIP) effort. The addition of this comprehensive, reliable, and accurate battlefield identification system to the combined arms forces will help reduce fratricide.

BATTLEFIELD DIGITIZATION

"Force XXI will control the power of information and technology and incorporate unprecedented battle command capabilities to ensure a more lethal, more mobile, and more survivable fighting force..."
Force XXI Campaign Plan

Digitizing the battlefield is the application of information technologies to acquire, exchange and employ timely digital information throughout the battle space, tailored to the needs of each decider (commander), shooter, and supporter, allowing each to

maintain a clear and accurate vision of their battle space. This vision is necessary to support both rapid planning and faster execution.

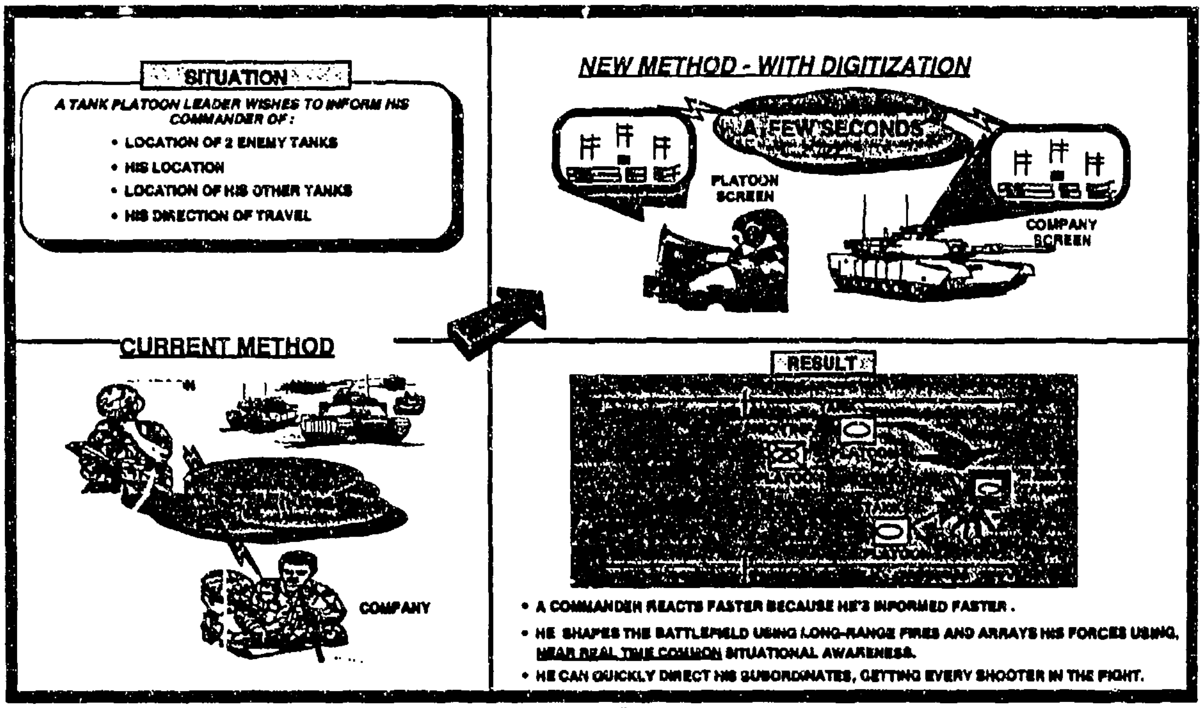


Figure D-12

The digital battlefield is a major component of Winning the Information War; it applies digital processes to capture the dynamics of the modern battlefield and the warfighter uses that information to direct forces in ways which will quickly defeat the enemy (Figure D-12). This capability gives commanders, at all levels, the hierarchical information they need to perform their respective missions most effectively, and provides both commanders and soldiers all mission relevant information simultaneously, and in near real time. The operational significance of this technology is enormous. Both friendly and enemy situations are constantly displayed; operations orders and graphics are transmitted in a matter of seconds; and initiative is never relinquished. In the integrated battle, every shooter is shooting based on a common picture of the battlefield; every system applies constant pressure to targeted enemy systems; and, by providing the common picture to support personnel, they have real time knowledge of critical supplies, permitting resupply on the move and thus increasing or sustaining pressure on enemy forces and allowing the commander to control the tempo of the battle.

The Army's drive to digitize the battlefield requires the development of sensors, processors, communications, and display systems. Key components of the emerging electronic battlefield are widespread combat identification, position/navigation technologies, automatic sensor suites, and communication devices.

Realizing the magnitude of this effort, the Army established the Army Digitization Office (ADO) on 8 July 1994, and chartered it to oversee and coordinate the integration of Army battlefield digitization activities.

The ADO is to ensure information age technologies needed by the 21st Century Army are fielded across the force in a synchronized manner. Both the Army Vice Chief of Staff and the Army Acquisition Executive (AAE) are personally involved in the direction of this office; the AAE has personal responsibility for the technical architecture associated with the digitization effort.

The Army released a request for proposal seeking industry responses to a requirement for sets of appliqué equipment to be applied to existing equipment in a heavy brigade sized unit. A series of experiments will begin soon. Starting with a digitized brigade (Task Force XXI) and culminating in a digitized corps, these experiments will be characterized by tight, iterative cycles for rapid prototyping, learning, and deciding which support the aggressive timelines of the Force XXI Campaign Plan.

Each appliqué set consists of a processor, a display, a data input device, an installation kit, and a communication interface device. The sets will be installed across the force--in equipment representing each battlefield functional area -- to experiment with new situation awareness, communication, and information technologies. Appliqué sets will be installed in a wide variety of both tracked and wheeled vehicles and selected aircraft systems. Individual soldiers will be equipped with the Dismounted Soldier System (DSS) providing connectivity with the mounted appliqué sets. Systems which already have embedded digital capability will be upgraded to accept additional digital traffic.

The appliqué sets will be manufactured in three variants. Version 1, a Commercial Off-The-Shelf (COTS) model, mounted in a combat vehicle, is expected to be used in an environment less demanding than combat. Version 2 is a model modified to withstand the rigors of cross-country travel in both tracked and wheeled vehicles. Version 3 is a near Mil-Spec model which offers the highest affordable degree of protection and is intended for combat vehicles. An objective of the digitized brigade experiment is to determine the proper mix of these variants, in terms of types and quantities, required for the division experiment. The final large scale Advanced Warfighting Experiment (AWE) supporting the digitization effort is a corps-sized exercise. Prior to each experiment, digitization capabilities will be added to ensure pertinent data is passed from each echelon to the warfighting team; communication links will be studied to ensure the rapid passage of critical information, and software will be analyzed to provide full function command and control capabilities.

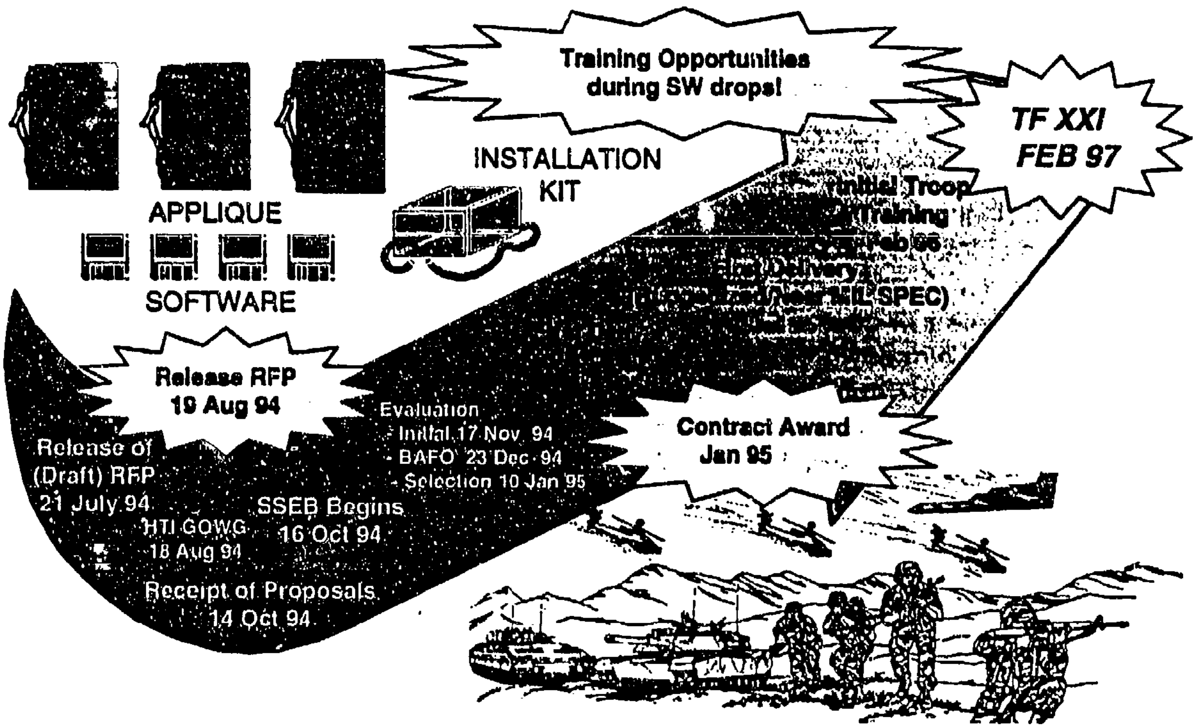


Figure D-13

Deliveries of the appliqué sets and software packages are expected to begin in March 1995. Shortly thereafter, initial evaluations will be conducted in TRADOC Battle Labs and the CECOM Digital Integration Lab. Experiments with larger scale units will occur in FY 97 and FY 99.

A limited capability currently exists to communicate via digits through the M1A2 Abrams Intervehicular Information System (IVIS), the M109A6 Paladin, the M2/3 Bradley Fighting Vehicles and through the Improved Data Modem (IDM) in the AH-64 Apache and OH-58D Kiowa Warrior. As digital appliqué sets are applied to several

different platforms and challenges are identified and resolved through the experimentation process, the program is expected to provide a significantly improved capability to forces throughout the entire operational spectrum.

Program Assessment:

Near-term: **GREEN** Mid-term: **GREEN** Far-term: **AMBER**

The near- and mid-term portions of the program are rated **GREEN** as funding is adequate through FY 99. The far-term portion of the program is rated **AMBER** because of the uncertainty of funding in the out years (beyond FY 99).

"I know where you are...I know where you aren't...I'm coming after you day or night."
General Gordon R. Sullivan
Army Chief of Staff

SECTION 4

RESEARCH, DEVELOPMENT & ACQUISITION STRATEGY

The HTI process begins with an operational requirement. Operational requirements for a specific HTI enabling strategy must be specified by TRADOC. These requirements originate as do similar requirements, through the Battle Labs and Louisiana Maneuvers processes. These operational requirements are then matched with technological solutions found in the Army Science and Technology Master Plan (ASTMP) and executed by AMC's Research, Development and Engineering Centers (RDECs). They are further evaluated and validated through Advanced Technology Demonstrations (ATDs), Advanced Warfighting Experiments (AWEs), and Advanced Concept Technology Demonstrations (ACTDs).

With an established requirement, TRADOC develops an overarching, umbrella Mission Need Statement (MNS). The MNS establishes the bridge between the HTI concept and the acquisition process. The MNS is reviewed, approved, and validated in accordance with the appropriate acquisition guidance. Once approved, the Headquarters, Department of the Army (HQDA) General Officer Working Group (GOWG) recommends to the Vice Chief of Staff, Army (VCSA) and the Assistant Secretary of the Army (ASA) for RDA that the MNS be specially managed and classified as an HTI initiative. The appropriate management structure is then chartered to implement the HTI Enhancement through the application of specific technologies.

HTI initiatives follow streamlined acquisition management procedures. The ASA (RDA) ensures the technology insertion is completely synchronized through management oversight of the respective PEOs and Program Managers (PMs). PEOs and PMs manage HTI as a part of planned system improvements and milestone upgrades. They continue to ensure the systems acquisition strategies and acquisition plans are designed to incorporate a horizontal approach.

As the technology advances, HQDA must ensure sufficient funding is allocated. HTI enabling strategies are resourced through individual Management Decision Packages (MDEPs), set up on a case-by-case basis. An MDEP will provide funding for both common, government furnished hardware and for the actual insertion and integration of the common hardware onto the designated systems. The PM who manages the specific platform receiving the technology will be funded by HQDA; PMs continue to be responsible for total system performance.

The HTI process presents opportunities for conducting materiel testing more smartly, effectively, and efficiently. Technical and Operational testing timelines and costs could be reduced by leveraging past tests, using modeling and simulation, and using common testing strategies.

Several technologies have been identified for integration horizontally across the force:

Digital Communications. As a central element of the Army's modernization vision, digital communications provides the architecture for an integrated battlefield. Digital enhancements increase the warfighter's capabilities to make rapid tactical decisions, in real and near real time, based on more accurate and current data fused from multiple sources. Position and location information, data obtained from sensors and satellites, advanced fiber-optic networks, state of the art communications, and graphical displays provide warfighters constant awareness of their surroundings. Advanced sensors, very high speed digital computer processors, wireless networks, and state of the art transmitters and receivers permit the development and rapid transfer of battlefield information in digital formats. Digital information transfer among lower echelon forces reduces sensor to shooter response times, crew workload, and decreases the potential for incidents of fratricide.

Future Data Radio. The Future Data Radio, currently in concept development, satisfies the greatly expanded data needs at all echelons of command, and provides enhanced capability for rapid reconfiguration, readily adaptable to the deployment requirements of the user. Reconfiguration is accomplished by simply down loading new software or exchanging standard functional modules. The radio is capable of providing short- to long-range secure voice and high speed data transmissions, and can operate in multiple bands/waveforms. Additionally, the system interoperates with commercial switching and the emerging Asynchronous Transfer Mode (ATM) systems being designed for multimedia communications.

2nd Generation Forward Looking Infra-Red (FLIR). Thermal imaging devices allow our forces unprecedented night vision capabilities. 2nd Generation FLIR offers dramatic improvements in range and resolution over the current FLIR.

Common Computer Processors, Advanced Fiber-Optic Networks, Data Buses, and Displays. Rapid advances in computer age, state of the art technologies are making information transfer capabilities more available and affordable.

Millimeter Wave (MMW). This technology provides query and answer systems which will permit point of engagement combat identification for aviation and ground-based maneuver forces, even through smoke and obscurants. MMW is effective in all types of environments, gives fast and accurate responses, is not vulnerable to enemy countermeasures, and is relatively easy to integrate.

Automatic/Aided Target Recognition (ATR). Significant improvements in locating and servicing targets are possible. ATR can be integrated with FLIRs and can support combat identification functions.

BCID ATD

The BCID ATD demonstrates enabling technologies and the integration of technology thrusts from multiple disciplines to satisfy mission requirements. Specifically, by leveraging the digital data link capability inherent to the near-term BCIS, it will demonstrate local situational awareness and target ID integrated with digitized command and control. This improved capability provides reliable, timely identification of friendly platforms and increases the accuracy and value of "maneuver SA" (operations planning, force synchronization information) by coupling this information with the hierarchical command and control network. The result could not only reduce fratricide, but also significantly improve combat effectiveness. The ATD also demonstrates enhanced battlefield combat ID by extending the capability to additional platforms, including dismounted soldiers and aviation assets, and investigates identification of hostile targets.

Battlefield Combat Identification
Advanced Technology Demonstration

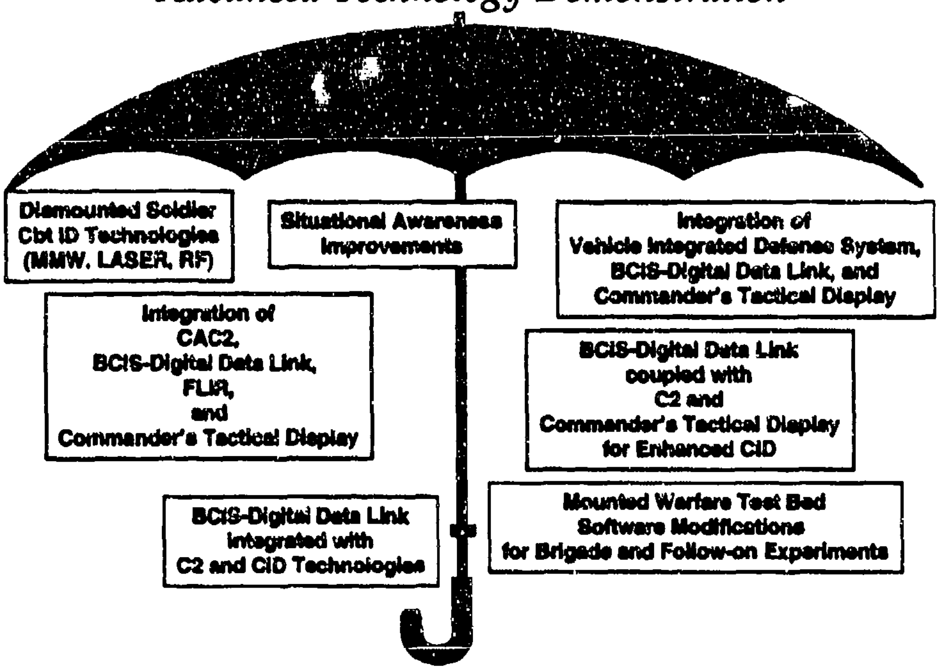


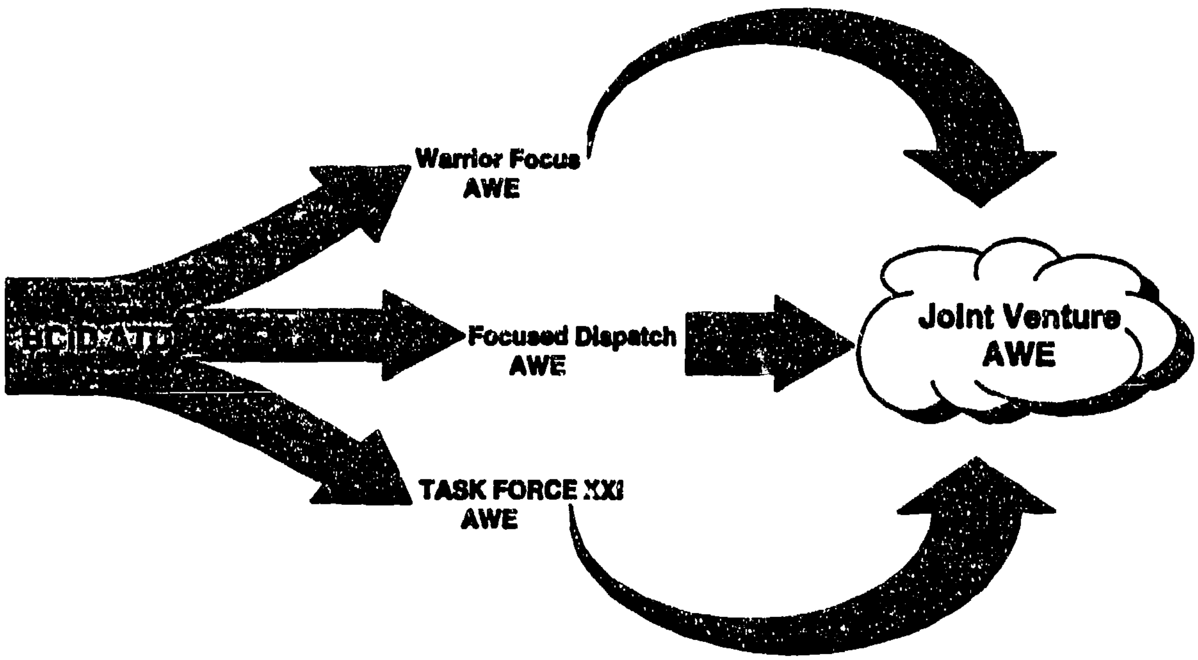
Figure D-13

The BCID ATD is in full concert with other Army modernization initiatives. Three modernization initiatives which relate most closely to the BCID ATD are the Army Battlefield Digitization Program, the Combined Arms Command and Control (CAC2) ATD, and the Second Generation FLIR Horizontal Technology Integration Program.

The BCID ATD will be conducted in two phases. Phase 1 demonstrates a digitized situational awareness/target identification appliqué and an air to ground

system investigation capability. The Phase 2 objective is to extend Phase I capabilities by demonstrating advanced concepts for a fully digitized friend or foe target identification/situational awareness/target acquisition capability integrated within a digitized division. Major activities will be performed in support of the demonstration phases:

Concept Definition Studies;
Simulation/Modeling;
Hardware/Software Development and Integration; and
Advanced Warfighting Experiments.



EXAMPLE OF CONNECTIVITY BETWEEN ADVANCED TECHNOLOGY DEMONSTRATIONS TO ADVANCED WARFIGHTING EXPERIMENTS

Figure D-14

The Concept Definition Studies examined potential technology options to identify the most promising alternatives for the objective system. These studies indicate that the most promising approach toward attaining the objective combat identification capability would be to build upon the BCIS MMW question and answer system. In addition to being able to identify individual friendly platforms, the BCIS can also serve as a digital data link. BCIS employs a highly directional antenna and an omni-directional antenna. The relatively low duty cycle and efficient data utilization of the BCIS allows time to pass digital data with little impact on target identification performance. Therefore, the existing BCIS waveform can be used not only for target

identification purposes, but also to passing situational awareness data within the local area (intra/interplatoon) and hierarchically into the C2 network. The BCID ATD seeks to exploit the inherent design features of BCIS and demonstrate the objective combat identification capability. The conceptual objective system incorporates these capabilities:

- Dual function Q&A target ID plus DDL for point-to-point and local situational awareness;
- Target position correlation with other onboard sensors;
- Presentation of target ID through acquisition sensor sight; and
- Feed to C2 and commander's tactical display.

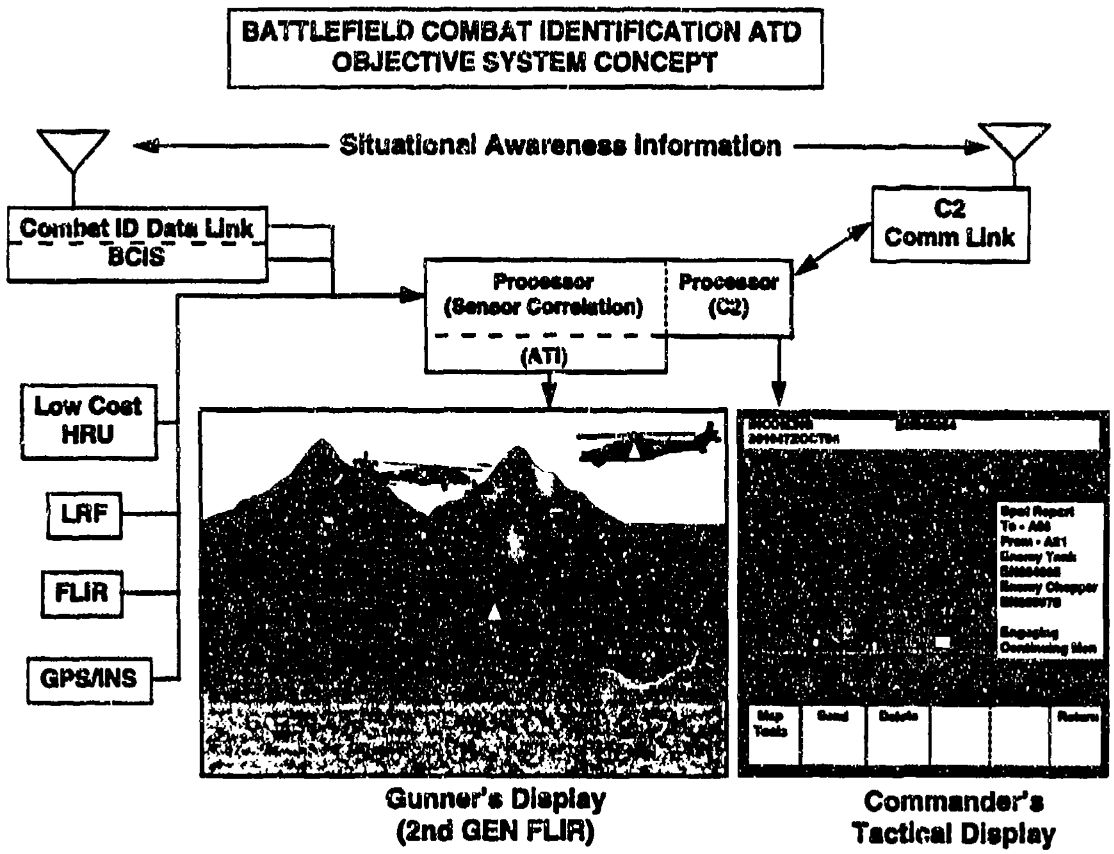


Figure D-15

Target coordinates determined from sensors onboard the weapon platform (GPS receiver, Heading Reference unit, and Laser range finder) are correlated with friendly platform position information reported over the BCIS digital data link and situational awareness information from the C2 network. This results in significantly increased combat effectiveness. Target identities are indicated in the weapon systems Second Generation FLIR target acquisition sight in the form of icons overlaid on the digital target imagery. This directly supports the fire-no fire decision and means gunners do not have to look away from the sight to obtain desired target ID information. The digital

data link feature of BCIS is used to distribute this same information to other friendly units in the local area, and to command echelons via the C2 network.

The objective system for the dismounted soldier is similar to the objective system on vehicles and aircraft. However, due to weight and size considerations, the objective system for the dismounted soldier must be integrated into planned soldier systems' components. Target ID and situational awareness inputs are to be correlated with the soldier's thermal weapon sight and helmet mounted display. This dismounted objective system interfaces with vehicle and aircraft systems to provide a seamless combat ID architecture across the battlefield.

Making combat ID technologies sufficiently small and lightweight so they do not burden the dismounted soldier is a significant challenge. One means of achieving this may be to employ single components that perform several functions. The Dismounted Soldier AWE will examine the capability of planned soldier system components, e.g., radio, computer, range finder, target display, etc., to perform combat ID and other functions.

The milestones and timelines for the BCID ATD are:

BCID ATD
Objective System Program Schedule

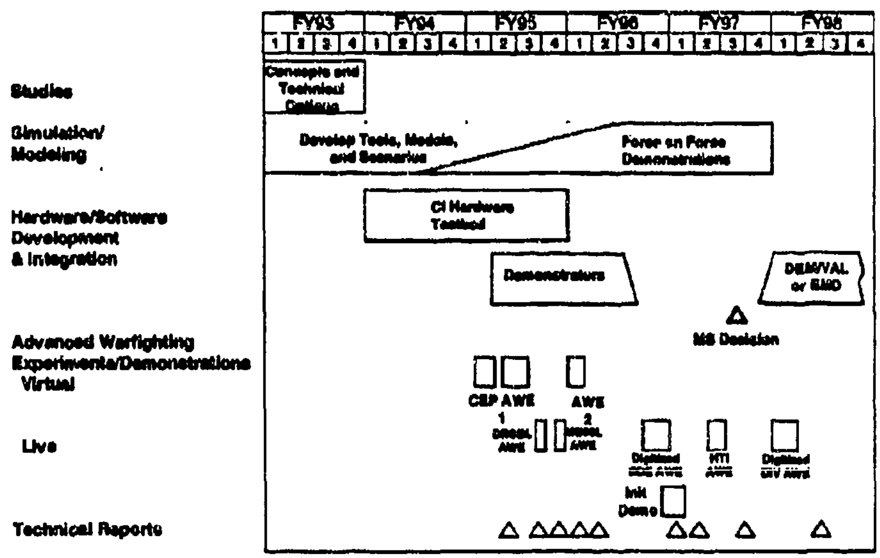


Figure D-16

SECTION 5

CONCLUSION

"We must remain fixed on one standard--protect and defend the Constitution and the Republic. For combined arms leaders today, that standard means maintaining our Warfighting Edge. We can help do that by improving synchronization of the combined arms on the battlefield. The ability to deliver decisive victory the next time the nation calls depends on our fighting as a fully integrated combined arms team."
General Gordon R. Sullivan
Army, Chief of Staff

HTI has the potential to provide force improvements in orders of magnitude beyond old ways of doing business. The HTI approach changes the environment and the process in which our Army modernizes. Vertical barriers, rigid, outdated approaches, and competing priorities give way to smarter practices. As Battle Labs break traditional molds, so too are modernization and acquisition processes altered. Successful implementation of HTI initiatives requires high priority, carefully written, effective requirements documents and well-developed acquisition strategies and plans. HQDA, working with the PEO structure and user community, must synchronize several acquisition programs to integrate technical improvements horizontally across the force. Hard choices must be made as force capabilities are balanced against available resources.

Technology outpaces the acquisition cycle. To succeed in the modernization process, the Army will use creative, flexible, and responsive ways to satisfy its needs. Initiatives will be undertaken to streamline the acquisition process. We will work with industry to influence the direction of R&D, exploit commercial advances, and resort to Army-funded technology base improvements when necessary.

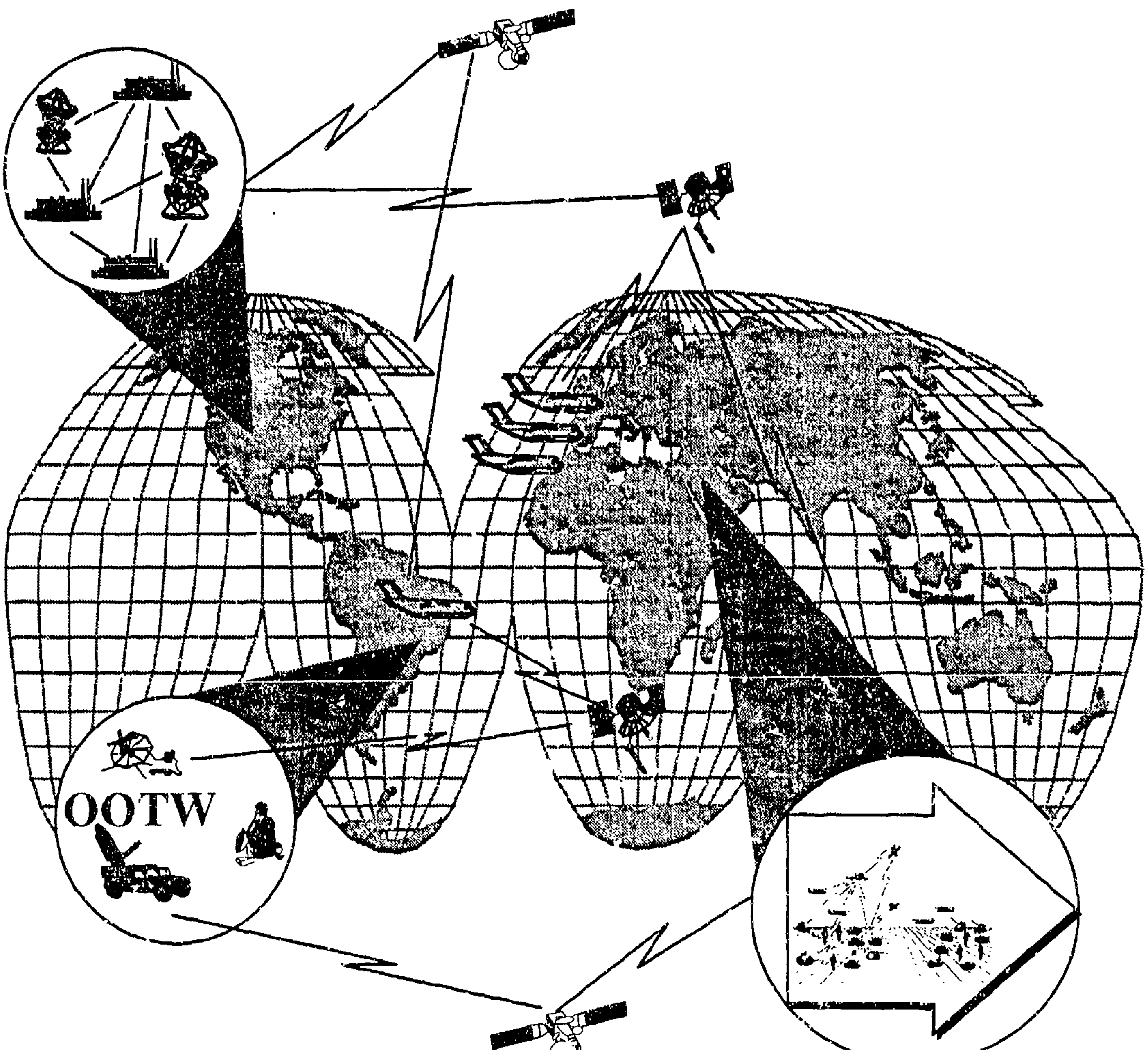
A strategy of vertical integration by echelon, and horizontal integration across functional areas, requires a deliberate and planned approach. Integration begins with concept development. Cooperative designs and tradeoffs among functional areas will reduce duplication of hardware and software and eliminate stovepipe systems. Multifunctional equipment, shared data bases, and distributed processing are examples of technologies available to support this concept.

Equipping the warfighter with the most advanced technology is not enough. More important is how the Army integrates new technologies into its forces. Just as TRADOC focuses on doctrinal integration, functional proponents work together to identify opportunities for cross-system integration, and developers cooperate to design integrated systems that exploit commercial technology.

The paramount focus of HTI is to maximize available resources and keep pace with rapid advances in technology, thus assuring Army Warfighters are equipped with superior capabilities.

ANNEX E

COMMAND, CONTROL, COMMUNICATIONS, & COMPUTERS



ANNEX E

COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTERS (C4)

SECTION 1

INTRODUCTION

Rapid progress in information transport, storage, and formulation require unprecedented modernization of C4 systems. The Army's C4 modernization responds to its five Modernization Objectives: Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle.

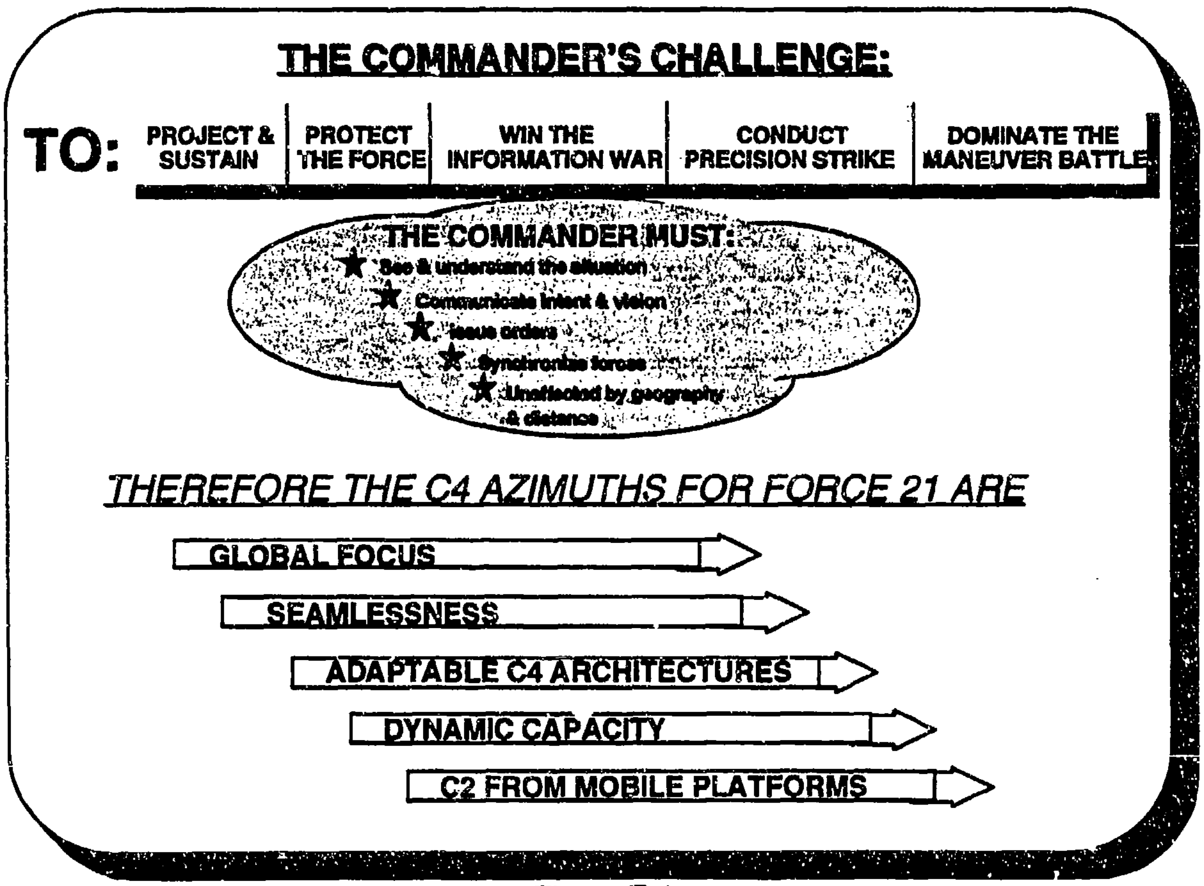


Figure E-1

Further, this annex elaborates key efforts to support Force XXI, in general, and the actions along the Force XXI Axis labeled "Information Age Army." In this vein, this annex specifies important programs that support each battlefield operating system's modernization goals by providing necessary communications and computing linkages to effect system integration on the digital battlefield.

Specific computer terminals and communications systems, key components of post Cold War C2, are discussed here, while C4 systems, specifically those that contribute more to Army base operations and the infrastructure which serves as power projection platforms, are set forth in Annex F (Information Mission Area) of the Modernization Plan.

Under the overarching modernization objectives, C4 programs help the Army perform its various missions by leveraging technologies so as to meet the information needs of warfighters and to dominate the battlefield. C4 modernization supports Force XXI battlefield commanders by providing and transmitting information globally, using seamless communications systems, responding to changing battlefield architectures, meeting the growing communications capacity requirements, and working on mobile command platforms.

Army Enterprise Strategy

This document embraces the Army Enterprise Strategy, principles, and plan by which the Army exploits current and future information technologies, adopts new systems, and uses executive decision-making to advance the capability of the Total Army Force.

SECTION 2

WARFIGHTING CONCEPT

ARMY BATTLE COMMAND

The Force XXI must live, train, and fight in a world characterized by fragmented threats, new roles, decreased defense budgets, and high technology products available to everyone. The force projection army, primarily stationed in CONUS, will be expected to mobilize and deploy quickly anywhere in the world. Deploying with minimal intelligence and logistics support, it must be capable of split-based operations--depend heavily on its infrastructure and national sustainment base one or more oceans away--and, at the same time, contend with more violent and fluid battlefields and the more ill-defined, often rapidly changing nature of operations other than war (OOTW). The battlefield C4I architecture to support such missions is shown in Figure E-2.

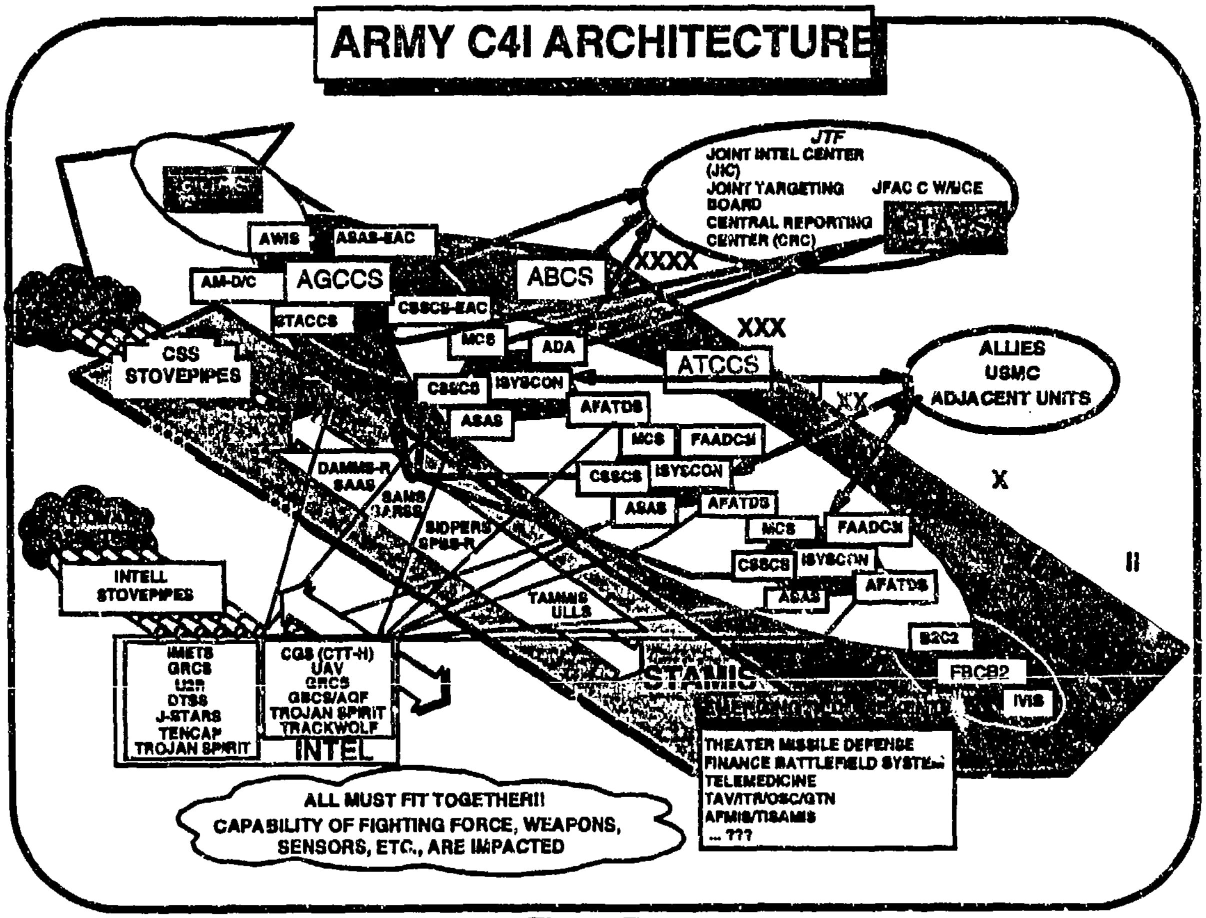


Figure E-2

The key azimuths of C4 modernization. . .

To support the Force XXI Army, the C4 community must accomplish the means to transport information between warfighters and supporters at all levels of warfare. Systems employed to accomplish this information transfer need to collectively be characterized by the following key features which are used here to establish modernization's azimuths:

Global Focus: Supported by a **global** grid, the Army Battle Command (ABC) architecture extends from the strategic installation (the main power projection platform), through the theater of operations, to the operational and tactical headquarters, and ultimately to the foxhole. The signal support architecture culminates in near real time digital information transfer among the various functions of tactical Battlefield Operating Systems (BOS) at brigade and below. Space-based communications systems are a principal capability to ensure global outreach of Army forces which project power from their home installations. Connectivity and interoperability with joint, multinational, and interagency systems is required at all levels.

Seamlessness: The ABC architecture requires end-to-end, protected, **seamless**, multi-gigabit, information transfer and processing capabilities for the warfighter whenever and wherever it is needed.

Adaptable Architectures: The ABC architecture is a multimedia system of systems with capabilities such as video, imagery, data, and voice. It creates an infosphere into which the warrior can "plug" and from it "pull" timely, relevant information rapidly, and then, once he wishes to do so, he can "push" information throughout his chain of command to adjacent, higher and lower levels. The key features of this system are its adaptability to changing battlefield requirements, support infrastructures, task force organizations, and mixes of equipment. The architecture:

- Exploits information management technologies;
- Provides seamless horizontal and vertical integration;
- Broadcasts information automatically through multilevel secure "pipe" lines;
- Provides common "applications" for all users; and
- Links automatically to joint and coalition networks.

Dynamic Capacity: C4 systems are available, where needed, when needed, and in the quantities needed, to all commanders and their battle support teams, vertically between echelons and horizontally at the force level, and among battlefield functional areas. Systems are scaleable to the appropriate level of command. This concept envisions standard, modular system support hardware and tailorable, functional support

software that maximize a common application infrastructure to create, assess, and update force level information (FLI) databases and the relevant common picture of the battle space. The availability of a relevant common picture presupposes the existence of reliable communications connectivity throughout the world, combined with an integrated information system capability, including required interoperability to joint and coalition forces.

Battle Command From Mobile Platforms: Power projection requires the extension of the C4 infrastructure to wherever the commander and his staff locate. Equally, enroute to an area of operations, commanders and staffs require the ability to send and receive critical information. They must also have the capability to react to this information while enroute through automated mission planning and simulation. On the tactical battlefield, key leaders are increasingly mobile. Therefore, C4 systems must be equally mobile to allow key leaders and staffs to operate without having to halt the pace of battle to emplace fixed C4 systems. Mobile platforms used to exercise battle command include wheeled and tracked vehicles and those aviation assets that can be configured routinely for this role.

The way ahead...

Split-based operations are the hallmark of a Power Projection Army. Such an Army depends on modem, robust communications and information systems in order to achieve Land Force Dominance irrespective of the location of the projected force. Technological advances dictate continuing efforts to modernize, yet, at the same time, ensure that requirements drive the development of new C4 programs:

DEPLOYABILITY: The Army must have C4 systems that enhance its capabilities to project, reinforce, and sustain forces with a high degree of strategic transportability and mobility. Contingency and reinforcing forces require rapid and effective deployment to any region of the world. Follow-on forces need C4 systems that interoperate with Force Package 1 units. Signal support systems that must have C-130, C-17, and C-141 Roll on/Roll off capability are critical to our force projection strategy. Systems must be deployable on standard sealift resources without disassembly, and must be transportable in sets.

System sizes and weights must be minimized for ease and quickness of deployability. A major focus of modernization, downsizes and reconfigures large communications systems to fit HMMWVs or even transit case/computer work station size (such as EPLRS net control stations and the CGS-100 switchboard). Downsized communications equipment also enhances support embedded on aviation assets and other combat systems where space and weight have traditionally limited the level of support in the past.

Theater Army component C3 organizations must be deployed early. They exist to engineer and manage theater tactical level C3 systems. Their key function is to integrate theater tactical signal support systems with host nation infrastructures and

unify theater communications matters (frequency management, communications security, architecture design, and assignment of assets) into a single cohesive entity.

The activation of the first Power Projection for Army Command, Control, and Communications (Power PAC3) company occurred on July 15, 1994. The company can be rapidly deployed into a logistically austere theater with little or no communications infrastructure and provide initial information services for Army contingency missions, including support to liaison teams.

COMPATIBILITY AND STANDARDIZATION: The Army will not operate alone. The capabilities of the U.S. Army are best realized through the integration and standardization of its many components working in concert with joint and multinational forces. Rapid task organization of an Army component during crisis planning often combines units into a single organization. This requires well thought out operational and technical architectures to ensure interoperability. The mix of forces can provide the overwhelming combat power necessary to meet the unique strategic, operational, and tactical requirements of any contingency.

Properly trained liaison teams are critical to the success of multinational missions. They are organized and provided between headquarters or elements without compatible communications (or language), and need a suite of communications equipment for secure voice and data. Lessons learned from Operations Desert Shield and Desert Storm reinforce this need for liaison teams which are provided in the Power PAC3 company.

EXPANDABILITY: Early in any crisis/deployment, communications support is austere, relying predominantly on single channel TACSAT or FM communications. Early deployment multi-channel satellite systems provide increased connectivity to out-of-theater locations. Once fielded, emerging ground satellite terminals will significantly enhance the ability of units to communicate over long distances as well as provide increased bandwidth for a variety of communication needs. Once in theater, systems begin to form a communications grid that is continually enhanced and upgraded as more equipment and units arrive. Switching systems, trunking plans, and telephone numbering schemes all need to consider expandability during initial planning.

RANGE EXTENSION: Often, communications required during conflicts or operations other than war (OOTW) exceed the capability of line-of-sight communications to provide the required degrees of connectivity. Space-based systems and terrestrial beyond line of sight systems are the principal means to ensure tactical systems are extended from power projection sites to the tactical battlefield. Fixed cable-based and fiber optic systems support connectivity into mature theaters of operation, where feasible. Unmanned aerial vehicles (UAV), tethered balloons, and surrogate satellites are all concepts being tested to provide additional range extension capabilities both to and on the battlefield.

SURVIVABILITY: All systems need to be re-evaluated with respect to survivability. Additional expenditures intended to provide nuclear hardening to new systems at Cold War levels need to be resolutely justified. However, there is a minimum level of survivability required of combat systems in a power projection force. The foremost requirement for C3 systems must be reliability, due to limited maintenance available during initial deployment into theater.

INTEGRATION: Tactical and operational success on the battlefield depends upon integration and interoperability of all communications systems within the Army, with other Services, and with allies. One can envision this as a "tactical internet." The integration of vast amounts of data characteristic to future battlefields will require completely digitized terminals and information systems fully integrated with each weapons system. Since Army forces usually operate as part of joint, multinational, and interagency forces, integrating support operations may yield efficiencies not otherwise achievable.

SECTION 3

CURRENT PROGRAM ASSESSMENT

This section describes the modernization programs that are key to digitizing the battlefield and supporting the warfighting concepts outlined herein. These systems overcome threats and challenges to battlefield command and control and are the weapons with which we can "Win the Information War." The current program assessments are thus:

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and

GREEN -- Adequate capability and quantity exists to perform the mission.

Army Battle Command System (ABCS)

The system that will accomplish common picture, situational awareness, and digitization of the battlefield is the Army Battle Command System (ABCS). ABCS is a conceptual and technical evolution of the existing ATCCS Battlefield Functional Area Control Systems (BFACS), the Army Global Command and Control System (AGCCS), and the Force XXI Battle Command Brigade and Below (FBCB2) system.

The ABCS subsystems--AGCCS, ATCCS, and FBCB2--provide functional capabilities to the warfighting commanders. The essence of ABCS is the migration of subsystem functional applications software programs to a common operating environment (COE) shared by all subsystems. The COE provides horizontal interoperability among all battle command systems, fighting platform to sustaining base. The COE ensures that applications from all subordinate systems will run side by side and will share information, giving plug-and-play functionality to the commander. It provides him with information as dictated by METT-T, rather than by some predetermined model.

As OSD and JCS develop the joint common operating environment and select common support modules, they will be incorporated within ABCS. The joint COE will provide joint interoperability needed by joint task force commanders for force projection command and control. This annex describes AGCCS and ATCCS in detail. FBCB2 is described in Annex D, Horizontal Technology Integration.

Army Global Command and Control System (AGCCS) - AGCCS is the Army component system that directly supports implementation of the Joint Global Command and Control System (GCCS) and provides the EAC portion of the Army Battle Command System. AGCCS supports operations from peace to war, including contingency and natural disaster operations. It supports the Army Component Commands, Army CINCs, Army JTF Commands and Components, and HQ, Department of the Army. Likewise, AGCCS supports all staff sections within a headquarters, and all phases of conflict. AGCCS can host necessary applications to support functionality of a JTF HQ. The primary purpose is to provide a single seamless command and control system that supports joint, multinational, and both Army strategic and operational levels of conflict.

AGCCS is built around the Joint COE and is an interoperable component of the GCCS. Its design ensures software and technology reuse and minimizes duplication among command and control systems. Interoperability is partially achieved from the "best of breed" process as AGCCS reuses software components from GCCS and GCCS reuses software components from AGCCS.

The AGCCS objective system is being achieved through the evolutionary process of fielding hardware, software, and communications components. These components provide commanders and action officers the functional capabilities currently defined in AWIS, STACCS, and CSSCS life cycle documents.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

Uncertainty about funding for hardware to transition from WWMCCS to GCCS causes AGCCS to be rated **AMBER** in the near-term. System development is fully funded in the mid-term. System operation is fully funded in the far-term; therefore, AGCCS is rated **GREEN** in the mid- and far-terms.

Army Tactical Command and Control System (ATCCS) - ATCCS is based on the expansion of MCS; it incorporates both the development of software applications to support the force level commander and his staff, and the integration of applications from the other ATCCS Battlefield Functional Area Command System (BFACS: Fire Support, Combat Service Support, Intelligence/Electronic Warfare, and Air Defense) into the common applications support software (CASS). This results in an Army Common Operating Environment (ACOE). It integrates modernization of these five computerized/automated command and control systems. The ACOE specifies common protocols, system languages, report formats, and necessary interfaces for each of the five independently developed systems to ensure an overall cohesive and compatible C2 system for the force. Additionally, ACOE provides the common connectivity means between the five arms of the C2 architecture through the Area Common User Communications Systems (ACUS); Combat Net Radios (CNR: SINCGARS); and the Army Data Distribution System (ADDS) comprised of Enhanced Position Location and Reporting System (EPLRS) and Joint Tactical Information Distribution System (JTIDS).

ACOE allows battlefield commanders to rapidly acquire and integrate information, determine optimal battlefield actions, direct their implementation, and control their execution in joint and/or multinational environments.

- **Maneuver Control System (MCS)**

MCS is an automated system to support C2 of the maneuver functional area. It is comprised of suites of common hardware computers, running standardized software, that support operations planning and control of maneuver forces, by integrating battlefield information from each of the functional areas. MCS provides commanders and staffs timely information on their forces, enemy forces, and the characteristics of the battlefield.

NEAR-TERM	MID-TERM	FAR-TERM
RED	AMBER	GREEN

In the near-term, MCS is **RED** due to the funding shortage for FY 95; Initial Operational Test and Evaluation (IOT & E) will not be conducted until FY 96. MCS is rated **AMBER** in the mid-term due to the fielding schedule that will begin in FY 97. The effect is a program fielding shift to the right. MCS Version 12.01 is urgently needed. HQDA is currently reviewing the funding stream to accommodate more fieldings in the mid-term. In the far-term, funding and development mature to allow a **GREEN** rating.

- **Advanced Field Artillery Tactical Data System (AFATDS)**

The AFATDS program is progressing toward Operational Test and Evaluation in July 1995. This system automates fire support planning, communications, fire mission processing and movement control in addition to providing seamless links to intelligence information from the All Source Analysis System (ASAS). The combination of AFATDS with other portions of ABCS allows flexible employment of fire support systems for close and deep strike fires. Current improvements to fire support automation include procurement of a lightweight version of the Forward Entry Device (FED) for light division forward observers. For more detailed information on AFATDS, refer to Annex H.

- **Forward Area Air Defense Command and Control (FAADC2)**

FAADC2 uses a block development approach that emphasizes centralized processing in the division rather than processing at individual sensors. Additionally, the architecture ensures the AWACS information for TMD is available at the applicable Air Battle Management Operations Center and Army Airspace Command and Control element. For detailed information on FAADC2, refer to Annex I.

- **All Source Analysis System (ASAS)**

ASAS also uses a block approach to provide the warfighter a dynamic intelligence picture of the battlefield. Fused intelligence will be available to force commanders and staff through a seamless interoperable intelligence system. For detailed information on ASAS, refer to Annex G.

- **The Combat Service Support Computer System (CSSCS)**

The CSSCS architecture evolves through software versions that concentrate on the integration of the STAMIS into CSSCS to provide a common logistic picture to all the Army BFAS. The CSS functional proponent will continue to refine split-based operations and incorporate its capabilities into all posts and stations supporting tactical forces. For detailed information on CSSCS, refer to Annex M.

- **Common Hardware/Software (CHS)**

Common hardware/software is provided to the Army battlefield functional areas to minimize the number of unique hardware and software systems used for Army Command and Control. Hardware and software will evolve through a series of buys, each infused with the latest technology.

- **Standard Integrated Command Post System (SICPS)**

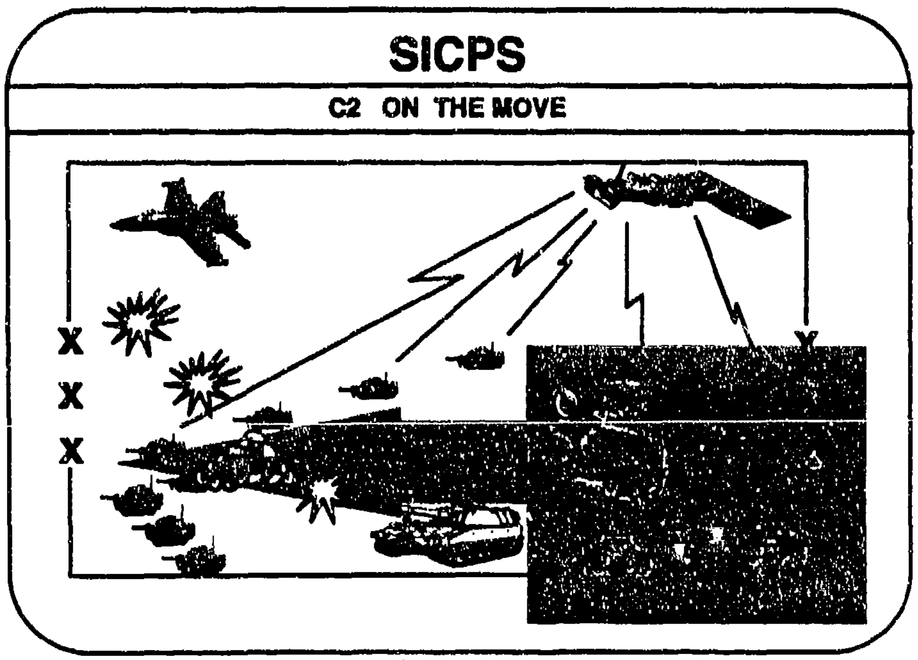


Figure E-3

SICPS is a family of command post facilities developed to house the Army Battle Command System (ABCS) across all battlefield functional areas. Variants of SICPS consist of a Modular Command Post Tent (MCPT), Rigid Wall Shelter (RWS), track vehicle CP (M1068), 5-ton expando Van CP, M988 HMMWV CP, and Large SICPS Shelter (LSS). These CP facilities provide C2 functions at corps through battalion levels. Fielding of the MCPT to light divisions has been completed. The remainder will be distributed with the other system variants. The First Unit Equipped (FUE) for the other variants is scheduled for FY 97.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	GREEN

SICPS is rated **AMBER** in the near- and mid-terms, due to MCS and AFATDS FUE slipping to FY 97. SICPS is funded through the EPA of the 96-01 POM, which gives it a **GREEN** rating in the far-term.

Communications Systems

The communication systems that link the elements of the Army's C4I architecture on the battlefield are the Area Common User Communications System (ACUS); Combat Net Radios; the Army Data Distribution System; and Tactical Satellite systems. Transition to commercially accepted Internet-like technology will greatly improve seamless data transport capabilities.

- **Area Common User Communications System (ACUS)**

The corps and below area common user communications system is Mobile Subscriber Equipment (MSE). Echelons above corps communications is provided by Tri-Services Tactical (TRI-TAC) communication systems. Both MSE and TRI-TAC become fully interoperable using a flood search circuit switched network and the same tactical packet network. MSE provides both mobile and static users, in corps and division areas, automated, secure, switched voice and data communications. Mobile subscribers can enter the system through a radio link using a tactical "cellular-type" secure telephone. With the exception of mobile access, Theater communications systems provide like services as well as additional strategic interface capacity.

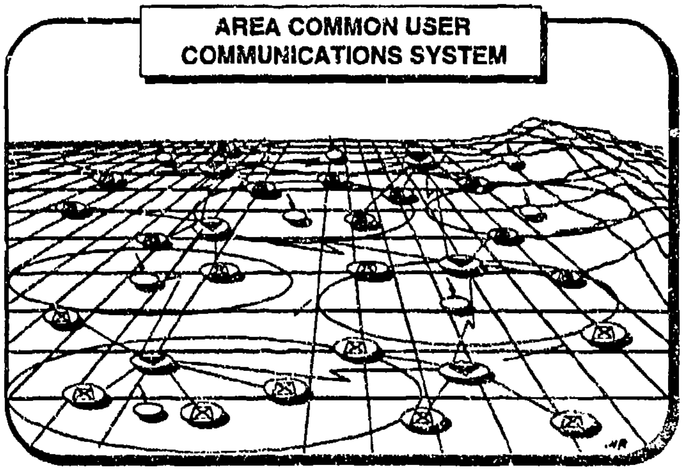


Figure E-4

ACUS is a full-featured, all digital telecommunications system for the battlefield. The Integrated System Control (ISYSCON), a joint program, provides technical Planning, Management, Command and Control (C2) of tactical communication networks which are collectively referred to as the wide area network (WAN). ISYSCON's Network Planning and Engineering (NPE) capabilities optimize the placement of network resources against user requirements, terrain conditions, tactical restrictions and communications security (COMSEC) relating to warfighter requirements. The ISYSCON provides integrated Battlefield Spectrum Management (BSM) functions to minimize adverse collateral effects of cosite and adjacent frequency interference in Army, joint and U.S./allied operations. It also stores and uses information regarding non-Signal Corps and non-communication emitters to manage the frequency spectrum. ISYSCON also provides a complete view of the battlefield WAN configuration and operational status in support of current and emerging fighting force seamless battlefield digitization requirements.

NEAR-TERM	MID-TERM	FAR-TERM
GREEN	AMBER	GREEN

ACUS is **GREEN** due to the recent fielding of Mobile Subscriber Equipment to the total force. Once the ABCS systems are fielded, mid-term ACUS is anticipated to lack bandwidth, rating an **AMBER**. In the EPA, funding to convert ACUS to commercial technologies that will be technologically advanced over the older ABCS system will once again rate a **GREEN**.

- **Combat Net Radios (CNR)**

CNR are the Single Channel Ground and Airborne Radio System (SINCGARS), the High Frequency Radio, and the Future Digital Radio.

—Single Channel Ground and Airborne Radio System (SINCGARS)

SINCGARS replaces the VRC-12 family of radios to provide commanders with a reliable, easily maintained secure radio for C2. SINCGARS incorporates effective electronic countermeasures against threat jamming through the use of frequency hopping spread spectrum technology. The radio has been consistently improved through technology integration. The SINCGARS family of radios is produced by two manufacturers and provides voice and limited data transmission capabilities. Current system improvement program (SIP) for the SINCGARS radios specifies the integration of Global Positioning System technology, improved data throughout rates, decreased weight, and improved interoperability, both voice and data, with the Mobile Subscriber Equipment (MSE) and EPLRS through use of internet controllers. The SIP SINCGARS debuts in FY 96 and is retrofitted to Force Package I units. The program is to be completed in FY 04, with fielding of SINCGARS to the total force. The Frequency Hopping Antenna Multiplexer, used with up to four collocated SINCGARS radios, allows use of a single antenna. This reduces both electromagnetic interference and the electromagnetic signature of high priority sites and mobile battle command platforms.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	GREEN

Due to the stage of fielding, SINCGARS is rated **AMBER** in the near- and mid-terms. Fielding is fully funded in the EPA of the 96-01 POM; therefore, SINCGARS is rated **GREEN** in the far-term.

—High Frequency (HF) Radio

The Signal Center identified a requirement for a new family of HF radios to provide the Army an over-the-horizon communications capability that would be user owned and operated. The new radio would have embedded COMSEC and an internal modem for ease of data transmissions. The HF radio would interface with ATCCS common hardware and software and be user friendly. Various versions of the radio would be developed for various applications: manpack, low power vehicular mounted, high power vehicular mounted, and high power rack or bench mounted and low power aircraft mounted.

A formal HF radio operation requirements document has not been completed; therefore, this item is unresourced in the POM; **RED.**

—Future Digital Radio (FDR)

To meet the demands of battlefield communications requirements, the Force XXI Army will use a future digital radio that employs redundant ECCM techniques, multi-layered communications security systems, programmable/selectable and in some instances simultaneous, multi-band-multi-mode operating modes, and state-of-the-art

digital signal processing systems. Taken to its theoretical limit, this FDR will replace all push-to-talk radios (SINCGARS, EPLRS, TACSAT, and HF) and mobile telephones on the battlefield, and many other communications terminals now in use in stovepipe fashion in many functional areas. The FDR will be used in manpack, vehicular, shelter/bench mount, and airborne configurations.

Program in early definition stages; **RED.**

- **Army Data Distribution System (ADDS)**

ADDS is a Command, Control, Communications, and Computers network which provides high volume, real time data communications to support the ABCS. ADDS consists of the Enhanced Position Location Reporting System (EPLRS) and the Joint Tactical Information Distribution System (JTIDS).

EPLRS is a robust, reliable system that provides the passage of targeting data, combat orders, SITREPS, intel data, and messages between friendly units at the tactical level. EPLRS provides situational awareness by automatically tracking and identifying friendly units to other EPLRS equipped units. The system reduces fratricide and is interoperable with USMC's PLRS system.

NEAR-TERM	MID-TERM	FAR-TERM
RED	AMBER	AMBER

Current EPLRS procurement will only be fielded to a limited number of Force Package I units at a reduced BOIP level therefore EPLRS is rated **RED** in the near-term. Reprogramming is required in FY 97-98 POM to support additional acquisition, mid- and far-terms are rated **AMBER** as a result.

JTIDS, a joint program, is a computer-based radio terminal which is integrated into host Army Air Defense Command and Control Systems. It provides necessary real time, high volume data communications between users and joint (USAF and USN) targeting platforms.

Army and Ballistic Missile Defense Organization (BMDO) funding will procure enough systems to meet Army requirements; however, insufficient OMA funding is available to sustain the program so the rating is **AMBER.**

- **Communications Security (COMSEC)**

The Army procures, fields, and supports Army and DoD communications security equipment, which includes fielding of strategic, tactical, and sustaining base COMSEC support items for securing high frequency and ultra high frequency radios, satellite links, base telephone, data circuits, and telemetry. Special interest programs include

MILSTAR, GPS, WIS, AMIS, DDN, and over 400 other Army and multiservice programs.

NEAR-TERM	MID-TERM	FAR-TERM
RED	RED	RED

There are insufficient funds allocated in the 96-01 POM to field AIRTERM to all Force Package 1 units. Additionally, insufficient quantities of Secure Terminal Equipment (STE) are projected to be funded to field an adequate capability. Multilevel Security (MLS) procurement is unfunded.

- **Satellite Communications (SATCOM)**

—Defense Satellite Communications System (DSCS)

Currently, there are several plans to modernize the current DSCS. The **DSCS Operations Center (DOC)** plan envisions five separate fixed facilities to replace the current DSCS Operations Center Facility. DOC will control all operational aspects of DSCS SHF satellites to include satellite platform control and communications payload control to better support operational forces. **Jam-Resistant Secure Communications (JRSC)** will provide communications connectivity that survives jamming and high altitude nuclear events which cause high altitude electromagnetic pulse (HEMP) and other perturbed atmospheric conditions. **Universal Modem (UM)** is the next generation of anti-jam, anti-scintillation, low probability of exploitation technology to be fielded.

NEAR-TERM	MID-TERM	FAR-TERM
GREEN	GREEN	GREEN

DSCS satellite communications system is **GREEN.**

—Army MILSTAR Program

The current Army MILSTAR program is developing the **Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T)** and the **Single Channel Anti-Jam Manportable (SCAMP)** terminal to support echelons corps and below (ECB) units. The **SMART-T**, a new multi-channel satellite terminal, provides a range extension capability to the Army's Mobile Subscriber Equipment. The SMART-T operates in both low and medium data rates (LDR/MDR) and has the inherent capability of low probability of interception and low probability of detection. The **SCAMP** Terminal, a single channel terminal designed to interface with the MILSTAR LDR payload, operates in point-to-point and broadcast modes. SCAMP Block I (Manportable) provides critical command and control communications between HQ and major subordinate elements. The SCAMP Block II (Manpackable) significantly reduces the terminal weight and provides point-to-point and Combat Net Radio range extension for conventional and special operations forces. Both the SMART-T and SCAMP transmit in the EHF band and

receive in the SHF band; this provides low probability of detection/intercept of these communications.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

SMART-T is fully funded through the POM. SCAMP Block I is only partially funded in the near-term, thus rating **AMBER**. SCAMP fielding resumes in the mid-term, while SCAMP Block II has dollars available to support the technological advances required to meet the size and weight specification, thus the upgraded ratings.

—Tactical Satellite Communications (TACSATCOM)

TACSATCOM is the Army's primary tactical range extension satellite communications (multi-channel and single-channel) for C2 operating in the ultrahigh and super high frequency (UHF and SHF) ranges. Current modernization programs are the **Enhanced Manpack UHF Terminal (EMUT)** and the **SHF Tri-band Advanced Range Extension Terminal (STAR-T)**. The **EMUT** (AN/PSC-5) program modifies the existing family of single channel radios with embedded encryption and Demand Assigned Multiple Access (DAMA) capability. This allows better support of user demands for increased satellite access. The **STAR-T** operates with any commercial or military transponder-based satellite system within the X (DSCS), C and Ku (commercial), and SHF frequency bands. It interfaces with the tactical joint switching network, to include DDN, DSN, commercial, and the multinational corps switching networks. The STAR-T provides mission essential data, imagery, video, and voice communications at variable TRI-TAC/MSE data rates. The prime mover of the terminal will be the HMMWV. The deployable equipment package, including generators, are to be secured on a removable pallet mounted on the vehicle. The system is Roll on/Roll off capable for the C-130. The STAR-T replaces the aging fleet of AN/TSC-85B/93B TACSAT terminals at echelons above corps and will also be fielded to Corps Signal Brigades. This terminal significantly increases trunking capability which expands the efficiency and capacity of the joint switching network while reducing terminal size and maintenance costs of the currently fielded systems.

NEAR-TERM	MID-TERM	FAR-TERM
GREEN	AMBER	GREEN

Although **GREEN** in the near-term due to recent MST-20 fieldings, EMUT is reduced to **AMBER** for the mid-term due to insufficient quantities procured on the first purchase contract. Status will move to **GREEN** after next purchase contract is let. STAR-T is **AMBER** due to insufficient funds for the procurement of the STAR-T terminal in FY 99.

NAVSTAR Global Positioning System (GPS) - A satellite-based, global, all weather radio navigation system provides highly accurate positioning, velocity, precise

timing information, and a common military grid for an unlimited number of users. It consists of three segments: Space Segment (GPS satellites operated by USAFSPACOM); Control Segment (ground control stations operated by USAF); and User Segment (GPS Receivers). Army GPS user equipment consists of passive receivers for air, ground, and sea users; these provide accurate navigation information for maneuver, and support forces, precise positioning for firing platforms and target location for precise munitions in support of deep fires, indirect fire systems, and precise timing for communications and command and control systems. GPS is a robust system capable of denying full military accuracy to unauthorized users (Selective Availability (SA)) and overcoming the threat's ability to use GPS signal generators to degrade or deny GPS to authorized military users (Anti-Spoofing (AS)). GPS is considered essential to dominating the maneuver battle.

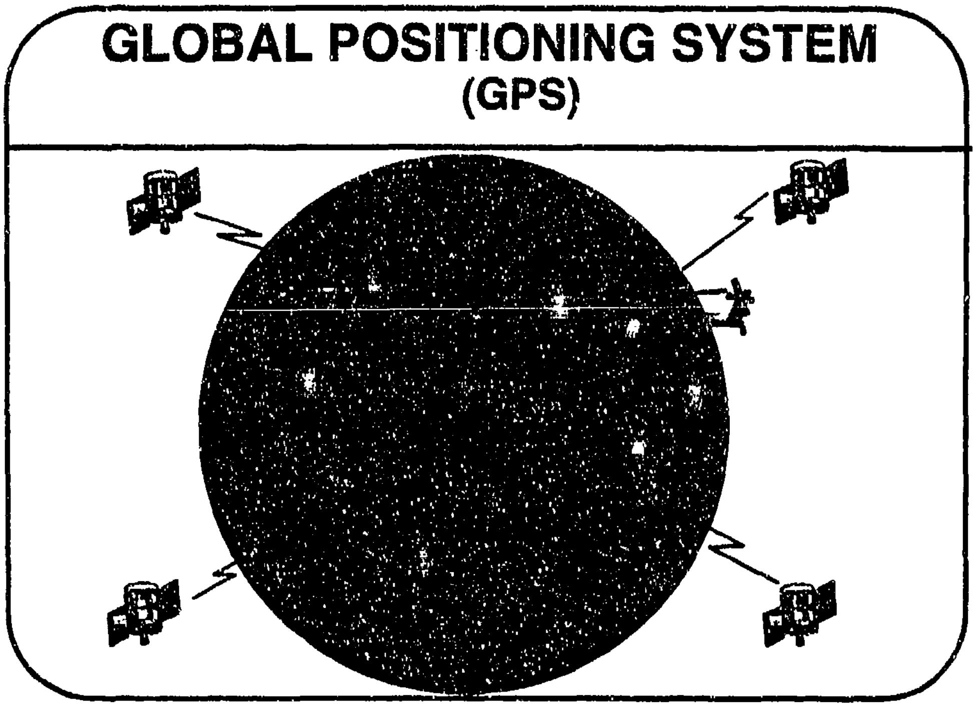


Figure E-5

SPACE SEGMENT

NEAR-TERM	MID-TERM	FAR-TERM
GREEN	GREEN	GREEN

USER EQUIPMENT SEGMENT

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

The current constellation of GPS satellites reached initial operational capability (IOC) in 1994 and will continue at full operational capability with follow-on replacements as required. The User Equipment Segment is rated **AMBER** near-term due to current

status of fielding. The GPS receiver is fully funded in the EPA of the 96-01 POM and scheduled full operational capability (FOC) in FY 97 and all weapon systems and aircraft are scheduled to have GPS integrated by the year 2000; therefore, GPS is rated **GREEN** for User Equipment in the far-term.

Command and Control Vehicle (C2V) - C2V provides a platform for tactical commanders of mounted forces to control the battle while on the move. C2V uses the MLRS chassis and provides space for up to four computer work stations and a complete space suite of communications equipment. Key features of the vehicle will be integrated environmental control and NBC protection, a drive train capable of matching speed and mobility with the supported force, a wireless local area network, and an integral quick erect antenna system.

COMMAND AND CONTROL VEHICLE (C2V)

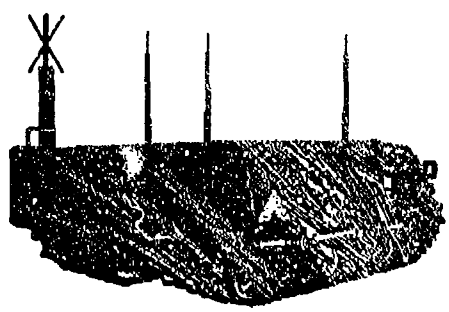


Figure E-6

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

Due to the fact the C2V is in Engineering and Manufacturing Development, the program is rated **AMBER** in the near- and mid-terms. The program is not fully funded in the 96-01 POM to meet the acquisition objective of 467 vehicles, therefore C2V is rated **AMBER** in the far-term.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

The C4 RDA strategy focuses on Land Force Dominance and primarily emphasizes Winning the Information War through the use of digital electronic technology. The Army Enterprise Strategy, the single, unified vision for the Army C4I community, serves as the enabler for Land Force Dominance. Integrating both current Army doctrine and modernization plans for the evolution of information systems, the Enterprise Strategy sets down what the Army must do to Win the Information War.

The evolution of battlefield C4 into the 21st Century begins with current systems as a baseline. In order to preserve current investments, a step by step block improvement approach is used. Improvements are modeled and simulated to determine military value and cost effectiveness prior to development and acquisition. Advanced technology demonstrations (ATDs) and other technology demonstrations, with total user involvement, examine emerging technologies for potential military applications to ensure that both the operational and technical capabilities are achieved.

Army modernization efforts are in the following general areas: battlefield digitization (also can be considered command and control) and communications. Battlefield digitization is the application of information technologies to acquire, exchange, and employ timely digital information throughout the battle space, tailored to the needs of each decider (commander), shooter, and supporter, allowing each to maintain a clear and accurate vision of his battle space necessary to support both planning and execution. Digitization allows the warfighter to communicate vital battlefield information instantly, rather than through slow voice radio and even slower liaison efforts. The baseline objective of the digital battlefield is to Win the Information War. Some key technology programs are listed below. Figure E-7 shows the roadmap to battlefield digitization.

Ground Combat Identification (ID) Demonstration (96-98) - The objective of this program is to select, develop, and demonstrate techniques (both target ID and situational awareness) that minimize fratricide during ground to ground and air to ground engagements and demonstrate integration of battlefield target ID and situational awareness information in the overall joint battlefield architecture.

Digital Battlefield Communications (96-01) - The objective of this project is to integrate communications hardware and software capable of providing seamless, multimedia communications for the digital battlefield, designed to meet emerging requirements for high capacity on the move information exchange.

Tactical Automation (96-01) - This is the Army's major Science and Technology (S&T) program to provide the architecture and products to implement the vision of a digital battlefield, defined by the Chief of Staff as essential to winning the Information War.

Tactical, Command, Control and Communications Technology Integration (96-01) - This project develops computer and communication systems in common hardware/software format to support battlefield decision-making.

Combined Arms Command and Control (CAC2) ATD (93-96) - The CAC2 ATD develops and demonstrates C2 functionality and shared situational awareness for brigade and below to include armor, aviation, mounted infantry, and fire support.

Battlefield Combat Identification (BCID) ATD (93-98) - This ATD aims to solve the combat ID problem (underscored by the lessons learned in Operation Desert Storm). This effort leverages existing technologies and pursues new technologies to develop and demonstrate systems that will solve the ground to ground and air to ground battlefield ID problem emphasizing covert and secure operations in the mid-term (FY 97-00).

Common Ground Station (CGS) ATD (93-95) - The CGS ATD demonstrates the receiving, processing, and displaying of multi-spectral intelligence information and the dissemination of intelligence products.

Battle Space C2 (97-00) - This demonstration leverages the results of the CAC2 ATD and integrates results from the battlefield Combat ID systems, Lower Echelon C2 Battlefield Operating system, Rapid Force Projection C2, Air/Ground C2 Platform Integration and Soldier Integrated C4I demonstrations.

Information Management System 21 (01-05) - This demonstration includes the integration of Enhanced Expert System Decision Aids and Advanced Interactive Interfaces into an expert information retrieval and decision support network.

Advanced Interactive Interfaces (92-96) - This program demonstrates intelligent soldier-machine interfaces to automated C2 systems. It will provide interactive, integrated voice, key board, and pointing device input, as well as voice, aural, and video output.

Some of the technology programs on the Roadmap for Communications Modernization are listed in Figure E-8.

Multi-band Multi-mode Radio (MBMMR) Phase II (95-00) - This program develops and demonstrates the ability of the MBMMR to meet advanced communications needs. Demonstrations include a radio access point with asynchronous mode switching, and digital cellular radio applications.

SAS ATD (91-95) - This ATD demonstrates C2 on the move and survivable C3 systems of various dispersed assets supported by multimedia connectivity.

ROADMAP FOR BATTLEFIELD DIGITIZATION

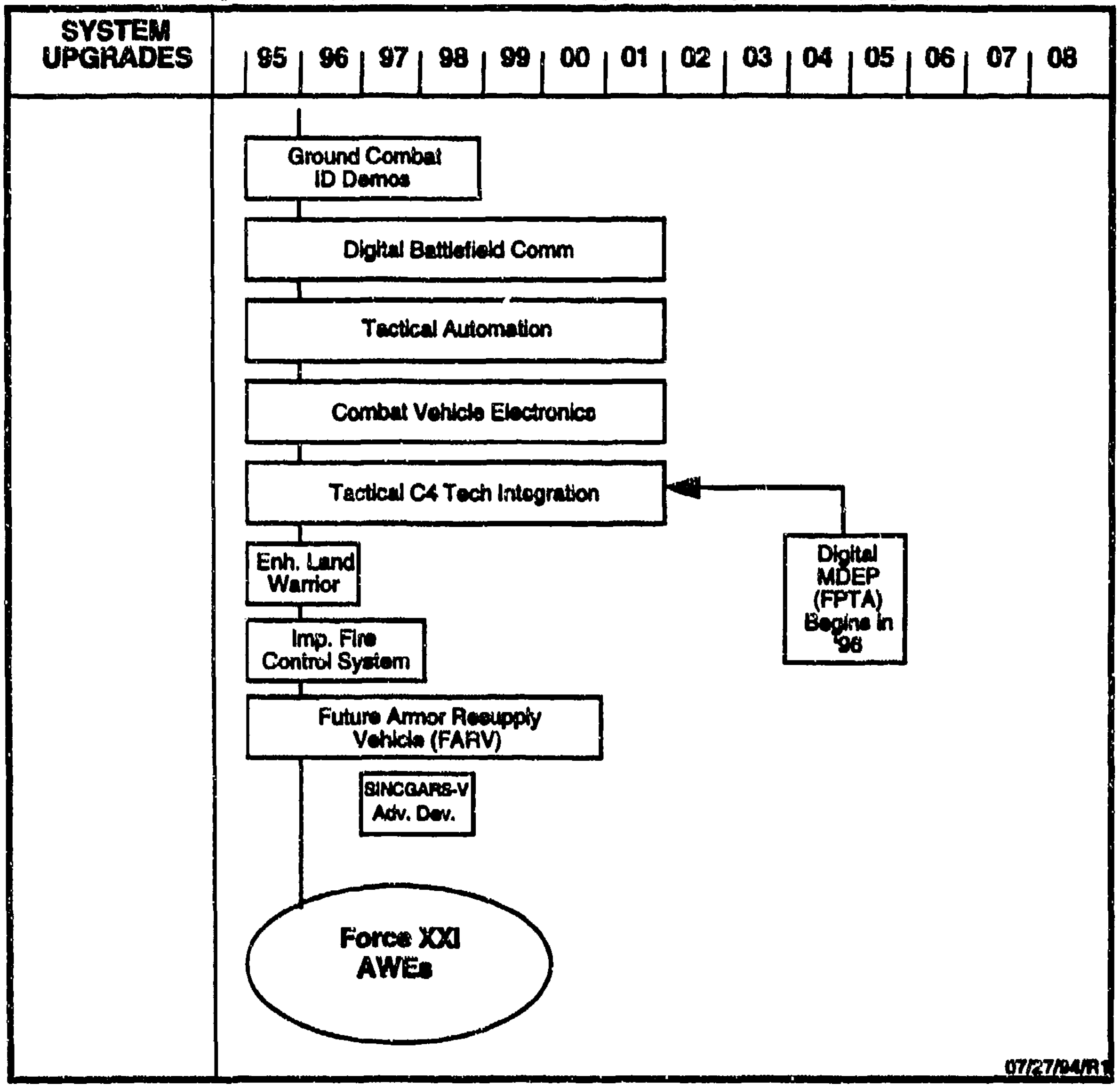


Figure E-7

ROADMAP FOR COMMUNICATIONS MODERNIZATION

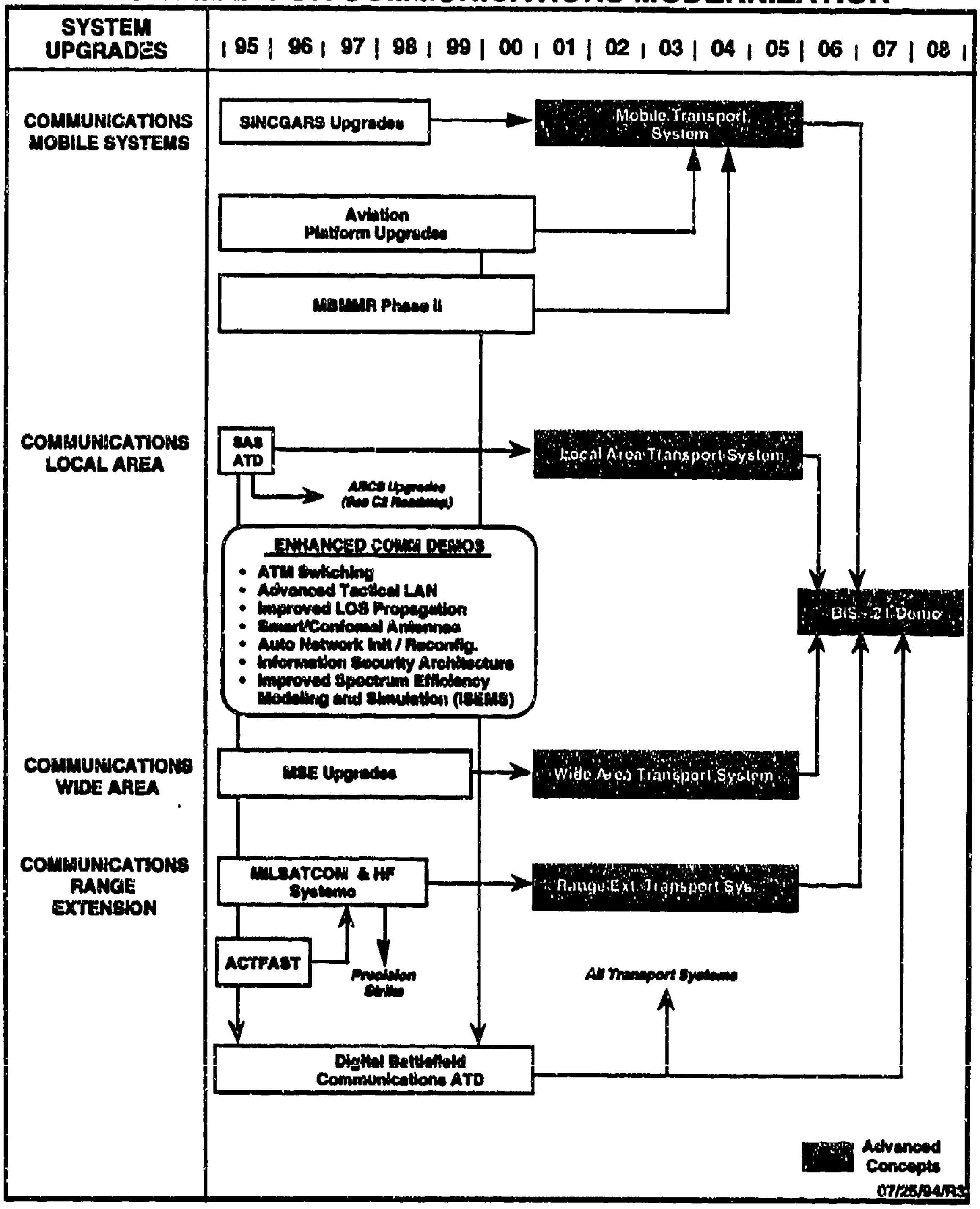


Figure E-8

C4 Acquisition Strategy

The Army is making significant strides to introduce automation to the field through the development of the Army Battle Command System. The Army will continue to modify and upgrade the Army Battle Command System, including both automation and communications systems capabilities, by using information technologies available from the commercial market as well as from government sponsored R&D. Government R&D efforts focus on areas not addressed by the private sector.

C4 R&D efforts focus on generating innovative solutions to the Army's warfighting capabilities in support of the Army's five modernization objectives. Advanced technologies are being pursued and leveraged into a set of System Upgrades and Advanced Concepts (SU/ACs); these address the materiel capabilities to:

- Identify and overcome those C3 factors which retard battle tempo;
- Determine how C3 systems can be made more robust and responsive to enable the intuitive commander to establish and maintain battle tempo from any position on the battlefield;
- Automate planning, provide decision support aids, and improve communications to decrease response times and improve success rates; and
- Display necessary information in a format designed to give commanders a common battlefield picture at multiple echelons simultaneously.

Post Cold War C2 Study and Action Plan

The Army's Post Cold War Command and Control (PCWC2) study is the result of a concentrated effort during FY 93 to reexamine the Army C4 and resulted in the implementation of the Force Projection Army Command and Control Action Plan (FORCPAC3). Early results represent a marked departure from traditional means of C4.

The PCWC2 model calls for increasing the Army's use of space by employing broadcast intelligence dissemination, establishing warfighter radio nets, and developing procedures for CONUS-based sustainment during force projection (split-based) operations. The model further requires the development of C4 automation capable of mobile operation with embedded GPS and stressing situational awareness. It also recommends improvements to the ABCS architecture to better accommodate units on the battlefield.

COMMAND AND CONTROL IN TRANSFORMATION

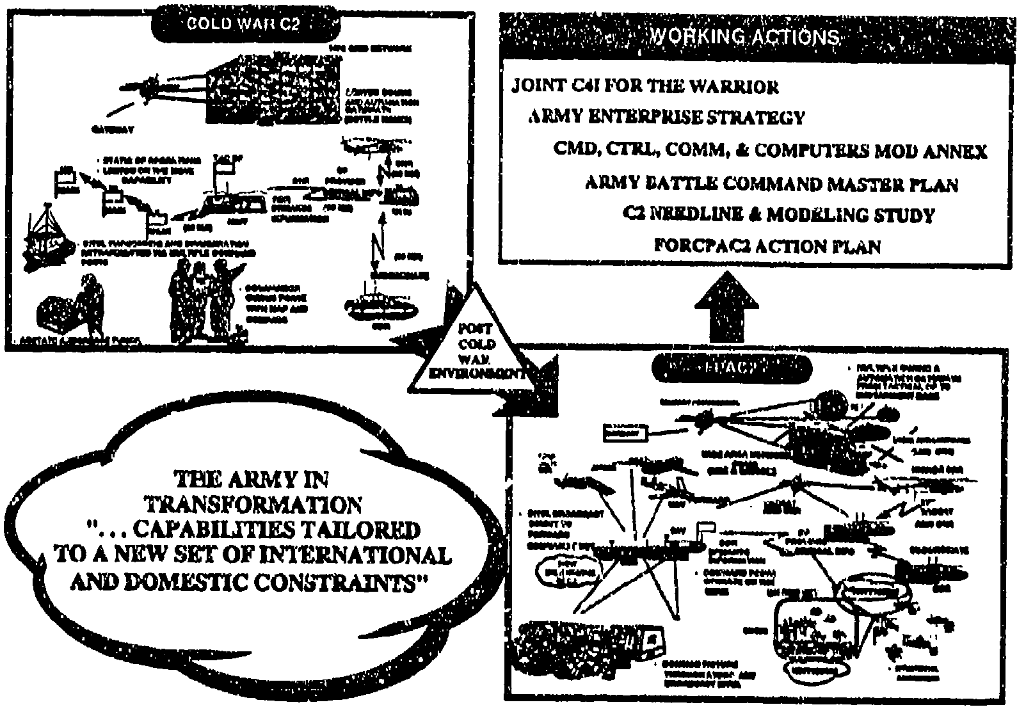


Figure E-9

Procurement

The acquisition of C4 systems will be guided by well defined standards including those governing interoperability and open systems architecture. This standardization will facilitate the integration of the tactical, strategic and commercial C4 systems into a seamless architecture. Acquisition strategies will focus on new technology insertion into existing systems to enhance capabilities and meet the requirements of force projection and support the achievement of Land Force Dominance. Procurement of NDI common hardware platforms and commercial off the shelf (COTS) products will reduce cost and accelerate fielding. The development of multilevel security capabilities for voice, data and automation networks will allow more efficient use of existing and projected systems. Incorporation of emerging commercial technologies will merge tactical, strategic and commercial C4 systems into a seamless network.

Industrial Base

The C4 acquisition strategy also addresses leveraging commercial capabilities to support strategic communications requirements. Interfacing with commercial satellites and telephone networks provides the flexibility to meet the requirements of force projection. Modernization efforts will focus on providing contingency forces with the capability to exploit existing C4 infrastructure.

SECTION 5

TRAINING

General

As automated systems and technological developments are fielded, innovative training programs must be in place. Computers and devices used to teach tasks, whether in institutions or garrisons, must replicate, or preferably duplicate, situations and conditions known or anticipated in combat.

Although command post exercises (CPXs) and tactical exercises without troops (TEWTs) will continue to be the centerpieces of C4 training, constrained resources require more emphasis on simulations, devices, and embedded training.

Simulations

C4 training will stress the use of virtual, constructive, and live simulations. Simulations will be used in both schools and units. The number of controllers required to monitor the simulations will continue to be reduced. Simulations allow training in functions and tasks that are difficult or impossible due to various constraints. Computer simulations allow replacing of exercises and decision processes to learn which tactics, techniques, and decisions provide the best results. Tactical automation will be used for garrison application; this will reduce or eliminate the requirement for separate sustainment training program on tactical automation devices. Embedded training will facilitate both individual and collective training in units.

Simulation devices are embedded in tactical C4 equipment and as stand-alone terminals to:

- Train C2 tasks at all echelons.
- Allow home station training.
- Utilize common data structures and linkages. Linkages are the interface which allows two or more simulations to share data, act on data, and share the results of the action (e.g., a CONUS-based division could participate in a exercise with a corps forward deployed in Western Europe).

Conclusion

Training will be based on the mission essential task list (METL). It will be multi-echelon and assisted by the combined arms training strategy (CATS). The CATS is a descriptive, notional, annual training program which integrates optimum combinations of full-scale live fire training with training aids, devices, simulators, and simulations

(TADSS). Training leaders and staffs in battle command, using the extensively technical systems proposed by this annex is a challenge for the materiel developer. Proficiency in battle command is accomplished by ensuring fielded equipment can be operated by intended users without special skills, by embedding emulation software in tactical automation terminals and communications devices, and by ensuring communications interconnectivity is routinely available to support linking numerous units in a training environment from home bases.

For detailed information on Army-wide training initiatives and issues, and explanations of fielding and funding status, consult Annex R to this Plan.

SECTION 6

CONCLUSION

The U.S. Army has had a long-standing advantage over both known and potential threat forces in C4 technology, procedures, and processes. The advantages in command, control, communications, and computers have produced enduring combat multipliers; these have compensated for our historical numerical inferiority.

Our exploitation of technology, particularly in automation and digitization of systems, is the means by which we improve the integration of information and determine optimal battlefield actions. Automation, based on a combination of distributed and replicated databases and the supporting communications, will enhance survivability by providing the capability to disperse cells of CPs over large geographic areas. This will reduce physical signatures and provide the capability to more rapidly and frequently displace to enhance survivability and to keep pace with the maneuver forces. Increased digitization and horizontally integrated systems will vastly improve our ability to act decisively and with greater depth of knowledge in shorter periods of time.

The use of computer simulations in C4 training offers excellent potentials to overcome deficiencies in the integration of information on the battlefield, and determine optimal battlefield actions and synchronization actions. Commanders have the capability to train their C4 organizations at low cost, have the capability to playback training to determine cause and effect relationships, and replay exercises to determine alternative actions.

Assessment

The Army's C4 system will continue to match or surpass corresponding changes in the threat. Exploitation of both available and emerging automation and communication technology will improve the application of combat power by enhancing the capability to integrate information, determine optimal actions, and enhance survivability by greater dispersion. Development of doctrine will match the acquisition and fielding of materiel systems and organizational changes. Training developments, especially computer simulations, will greatly enhance C4 training. Organizational design and force structure will keep pace with conceptual, doctrinal, and materiel developments. TOE documentation will better define the intent and subdivision of the organizations.

System Contributions

When fully deployed, ABCS will provide the Army a survivable and robust system capable of supporting the commander's decision-making process. It will allow the rapid acquisition and integration of information. The commander will have the capability to access information and obtain a picture of the battlefield from a multitude of locations. Because each system will be able to access the large picture of the battlefield, it will allow the commander the opportunity to make his CPs smaller. This, in turn, will make the CPs harder to target, and more mobile and survivable.

The communications systems, using frequency hopping, spread spectrum, burst transmissions, and their ability to automatically reroute transmissions will make the ATCCS system more survivable. The communications systems will also provide additional reliability and security. Additional benefits may include the reduction in the size of command posts and operational facilities in both size and personnel.

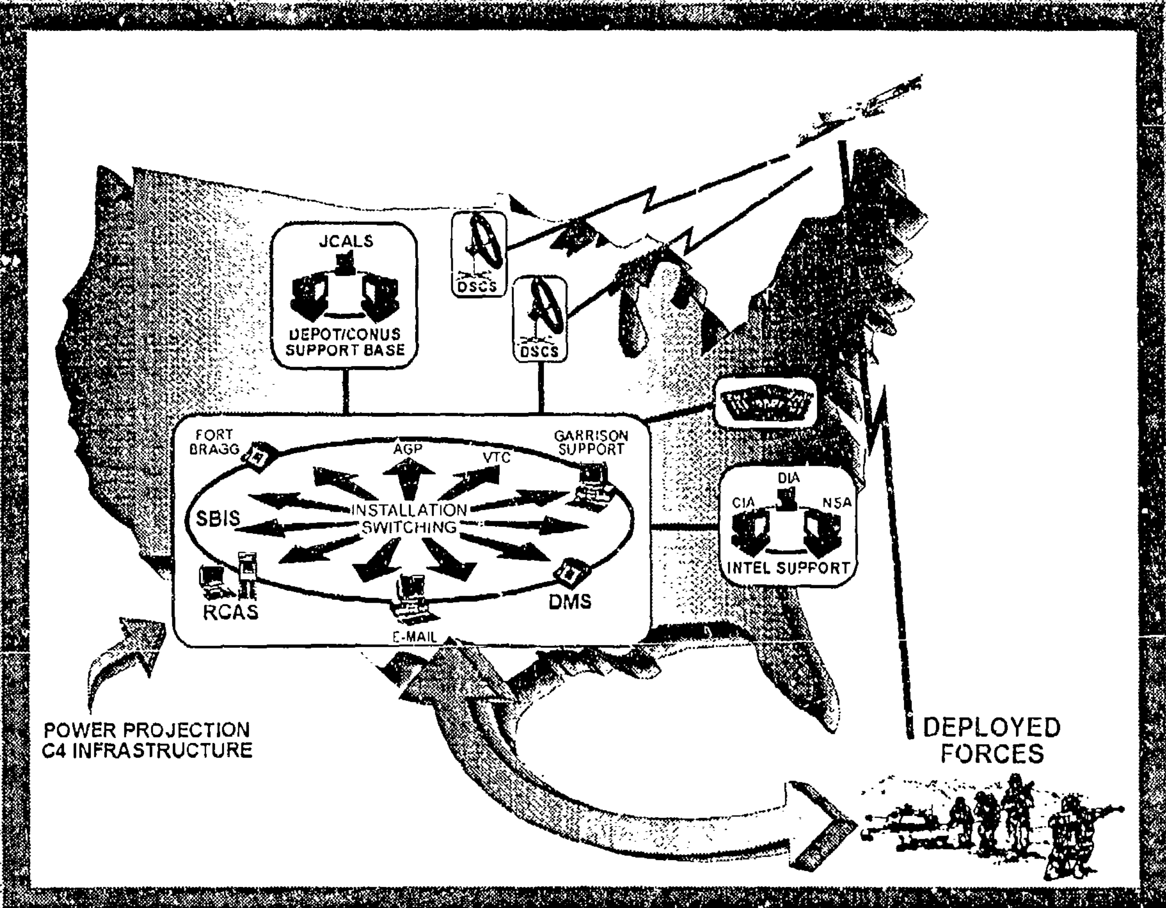
Summary

This annex focuses on the C4 modernization actions that are critical to achieving Land Force Dominance in the 21st Century. The present and future Army is dependent on C4 to ensure success. The sophistication of weapons systems, the expanse of the battlefield, the vast distances separating forces, and the speed at which strategic, theater level, and tactical decisions must be made all combine to mean that information must be acquired, processed, and disseminated to permit maneuver battle dominance. Thus, all five of the objectives of Army modernization depend on information processing and transfer as described herein. Continuing on the established modernization path will ensure the C4 requirements of Force XXI are satisfied.

ANNEX F

IMA INFRASTRUCTURE

PROJECT AND SUSTAIN
WIN THE INFORMATION WAR



ANNEX F

INFORMATION MISSION AREA INFRASTRUCTURE

SECTION 1

INTRODUCTION

"The Information Age is upon us and we must take full advantage of the maturation of information processing technology to maintain our standing as the best Army in the world into the 21st Century."
GEN Gordon R. Sullivan
Army, Chief of Staff

The National Military Strategy is predicated on a foundation of flexible engagement in a dynamic and uncertain global strategic environment. The Army, an instrument of national security and military strategies, can be called upon to conduct joint and multinational military operations across the range of military operations, from Operations Other Than War (OOTW)--peacekeeping and disaster relief operations--to operations in a major regional conflict.

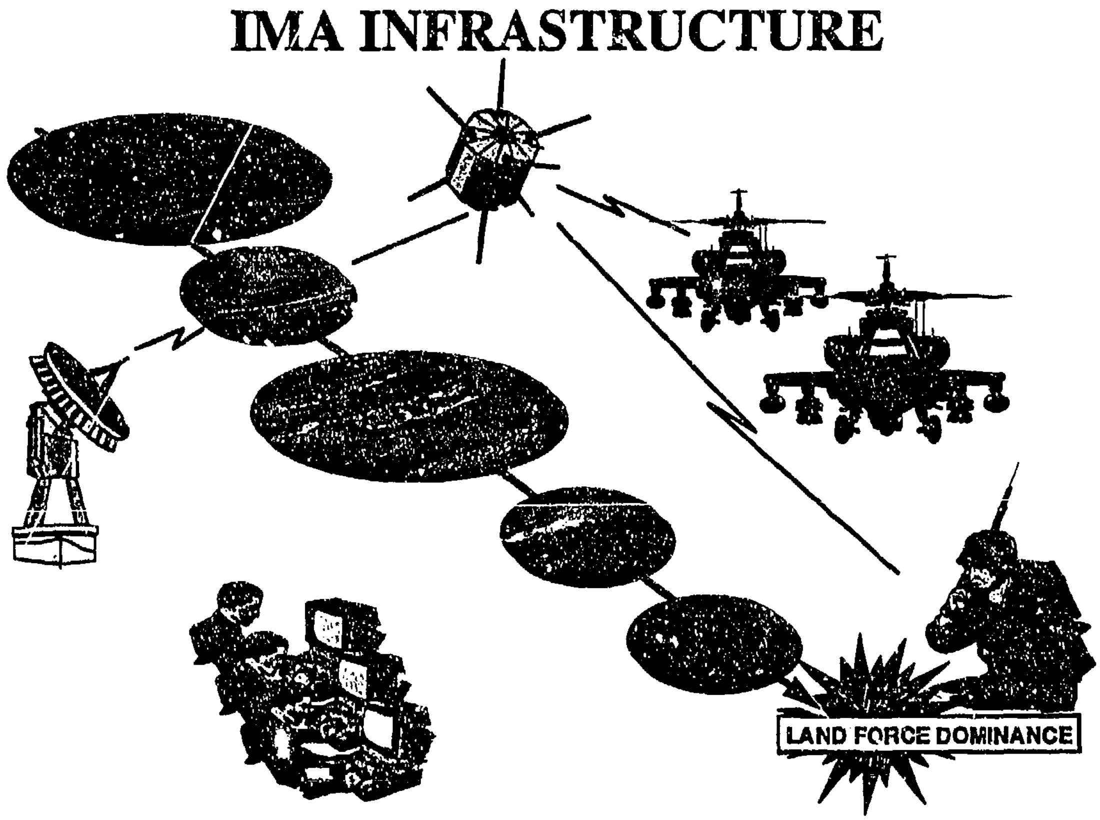


Figure F-1

The Information Mission Area (IMA) Infrastructure Annex F contributes to Land Force Dominance (Figure F-1) by supporting the modernization objective, **"Project and Sustain."** Annex F also supports the modernization objective **"Win the Information War."** Information technology is at the hub of the Army's new draft doctrine, *FM 100-6, Information Operations*. This doctrine acknowledges the paradigm shift that the microprocessor is exerting upon military operations under the guiding precepts for the Army of the next century -- **Force XXI**. The ongoing information technology revolution is dramatically improving capabilities to collect, process, disseminate, and use information.

Annex F supports the **Army Enterprise** -- a strategy, plan, and process to acquire a seamless, interoperable Army Command, Control, Communications, Computers and Intelligence (C4I) architecture which will leverage the force multiplier at the vanguard of Force XXI -- **Information Dominance**. C4I capabilities are key to advanced technology warfare based on rapid information processing and exchange. The ten Enterprise Principles guide the Army's modernization path toward the objective of a seamless, interoperable C4I architecture (Figure F-2). These ten principles are indicative of a multi-process framework for planning, requirements, and materiel acquisition of fully interoperable C4I systems to support the Force XXI Army.

Principles of

The Army Enterprise Strategy

"Enabler for Land Force Dominance"

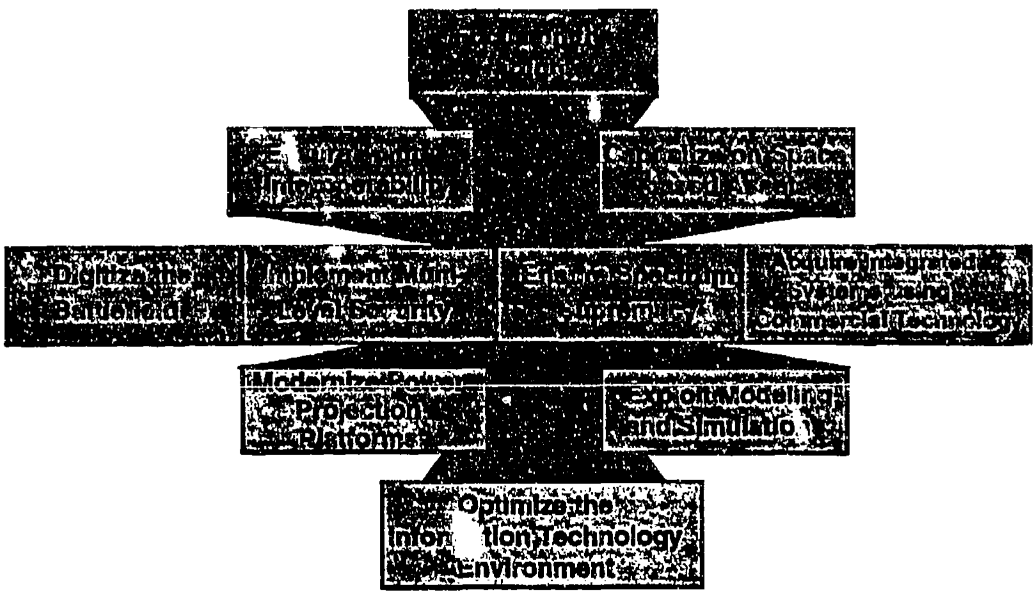


Figure F-2

• **Focus on the Warfighter.** This overarching principle is the lens through which the other nine Enterprise principles are focused to ensure that technology and resources deliver war fighting capabilities to the soldier.

• **Ensure Joint Interoperability.** Provide C4I systems that interoperate in joint and multinational operations. Standard communications protocols and data elements will ensure joint and multinational forces can share real-time situational awareness through access to common data bases and assured communications. This is fundamental to the Joint Chiefs of Staff C4I For The Warrior (C4IFTW) concept of operations.

• **Capitalize on Space-based Assets.** Assured access to mission-essential military and commercial space-based systems that will form the global communications grid. Space-based surveillance and communications platforms are essential for battle space management and information dominance.

• **Digitize the Battlefield.** Provide an integrated digital information network that supports war fighting systems and assures C2 decision cycle superiority. The shared situational awareness capability will ensure battlefield superiority by enabling the combined arms team to conduct precision strikes and to dominate high speed maneuver on the 21st Century battlefield.

• **Implement Multilevel Security.** Provide ability to access and exchange information at needed levels of classification using a single objective C4I system.

• **Ensure Spectrum Supremacy.** Provide the warfighter electromagnetic spectrum supremacy to maximize the benefits of maneuver and tempo in conjunction with firepower.

• **Acquire Integrated C4I Systems Using Commercial Technology.** Provide the warfighter synchronized C4I capabilities that leverage commercial technology.

• **Modernize Power Projection Platforms.** Turn Army installations into modern "Power Projection" platforms to support efficient transition from peacetime to wartime operations to include training, mobilization, deployment, split-based operations, and redeployment.

• **Exploit Modeling and Simulation.** Provide the warfighter cost effective training, testing, and rapid prototyping through state of the art modeling, simulation and networking.

• **Optimize the Information Technology Environment.** Provide more efficient information support for combat and peacetime operations. Ensure the training and development of information age professionals to ensure that the Army exploits information technology.

ARMY ENTERPRISE STRATEGY IMPLEMENTATION

The Army Enterprise Strategy Implementation Plan is the follow-on document to the Army Enterprise Strategy. It provides an institutional framework for the evolution and modernization of Army C4I systems. Nine implementation tasks involving the Army's planning, requirements, and acquisition communities have been developed to help achieve the objectives of Army Enterprise. These nine tasks also support the modernization objectives of all Army Modernization Plan annexes which rely upon the enabling capabilities of information age technologies. Those nine tasks are :

- **Task 1 - Develop a C4I Operational Architecture.** The Integrated Battlefield Architecture (IBA) presents the baseline Army C4I Operational Architecture. This task will examine the feasibility of enhancing/expanding the IBA to include operational relationships with the IMA Infrastructure.

- **Task 2 - Develop a C4I Technical Architecture.** This task develops and implements a C4I Technical Architecture. The Technical Architecture is derived from the Operational Architecture, and provides guidance to activities responsible for acquiring systems. The Technical Architecture identifies standards, top level system specifications, architectural interdependencies, technical interfaces, and supporting performance modeling results.

- **Task 3 - Refine the current Warfighting Lens Analysis (WFLA) systems evaluation criteria.** The WFLA is a systems evaluation tool to determine the relative merit of tactical systems. This task develops recommended changes to the WFLA criteria, to assure that the full spectrum of C4I systems encompassed by the Army Enterprise receive proper evaluation.

- **Task 4 - Restructure the C4I Architecture Control Committee (ACC) Charter.** This task results in a revised ACC Charter to assure that all planned C4I materiel acquisitions are properly assessed, integrated, and prioritized.

- **Task 5 - Embed the Army Enterprise framework in Army acquisition programs.** This task results in an update to Volume I of the Army Science and Technology Master Plan. The update assures that future Advanced Technology Demonstrations are done with cognizance of the ten Army Enterprise principles.

- **Task 6 - Incorporate the Army Enterprise Strategy in both the 25 series (automated information systems) and the 70 series (weapons systems) of publications.** This task results in recommended updates and possible consolidation of portions of the Army's 25 and 70 series publications (pamphlets and regulations) that deal with system acquisition and life cycle management.

• **Task 7 - Develop a policy to evaluate contractor ability to produce quality software.** This task results in the development of a policy to be used during the source selection process. The policy serves as the basis of evaluating a contractor's ability to produce quality software.

• **Task 8 - Include the Army Enterprise framework in Army plans and doctrine.** This task ensures the Army Enterprise Strategy is included in The Army Plan (TAP) and the Army Modernization Plan (AMP). In addition, the task ensures the Enterprise Strategy framework is also used to guide the future of C4I doctrine.

• **Task 9 - Oversee C4I Modeling.** This task results in the oversight, prioritization, and integration of C4I models used to facilitate tradeoff analysis and validation of the Operational and Technical Architectures and support efforts of the ACC.

Information technology advances are ushering in a revolution; the advances offer Information Dominance, the competitive advantage needed to win decisively, quickly, and with minimum casualties. The modernization strategy and programs addressed here support the Army as it negotiates the challenges and exploits the technologies of the information age.

SECTION 2

WARFIGHTING CONCEPT

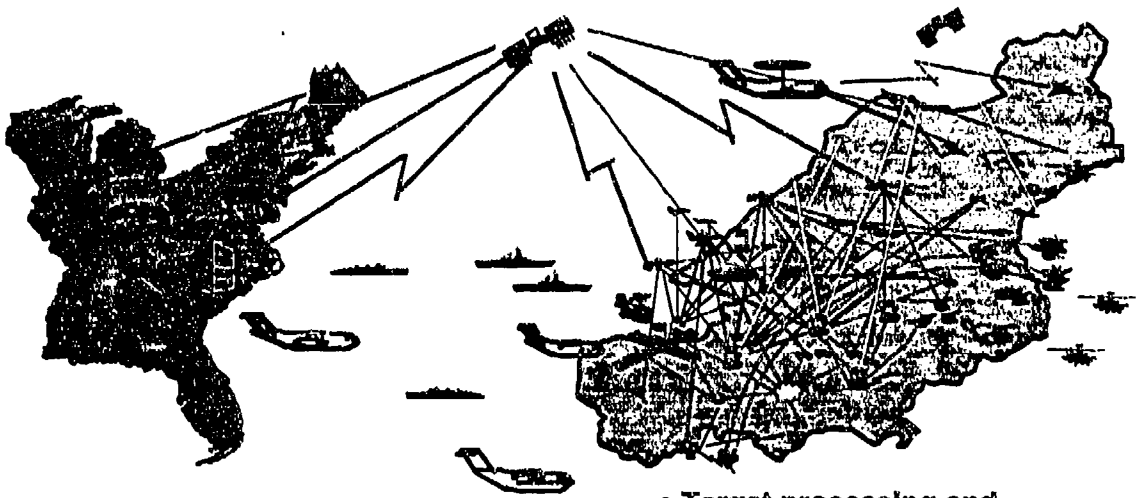
PROJECT AND SUSTAIN

"The power of information gives us unprecedented battle command capability and enables more efficient and effective power projection. Information gives meaning to the seamless web of America's Army."

" Our CONUS installations are being transformed into power projection platforms, capable of deploying and supporting forces in any region of the world."

GEN Gordon R. Sullivan
Chief of Staff, Army

Power Projection Platforms



- **Wargaming and mission planning support.**
- **Just-in-time resupply.**
- **Point delivered replacements.**
- **Telemedicine consultation.**
- **Split-based Operations.**
- **Target processing and engagement.**
- **Mission planning/rehearsal.**
- **Combat systems diagnosis and repair.**
- **Resupply processing and deployment.**
- **Casualty treatment.**

Figure F-3

Force XXI Operations acknowledges the paradigm shift that is occurring in the manner by which military operations will be conducted. The ability to rapidly gather, manage, distribute, and display information will provide the decisive advantage on the modern battlefield. Information technology advances are leveraging a capability niche in which Information Dominance is the definitive competitive advantage needed to win decisively, quickly, and with minimum casualties. The Army has embarked upon defining its operational requirements and strategies for warfare on the information age battlefield. This is conveyed by the draft *FM100-6, Information Operations.*

Draft *FM 100-6* indicates the overall objective of Information Operations (IO) is to enable, enhance, and protect the friendly decision cycle while adversely influencing an opponent's throughout the full range of military operations and at all levels of command. Lessons drawn from Operation Desert Shield/Desert Storm and OOTW in Somalia helped clarify the need for robust CONUS-based platforms from which to project and sustain warfighting capabilities. Force Projection Strategy (Figure F-3) depicts Army installations as power projection platforms where forces will live, train, mobilize, deploy, and remain in contact with the area of operations. The seamless flow of information via assured communications links will permit multi-functional support across a range of military operations necessary to support deployed forces.

"Home or remote stationary capabilities will reduce deployability requirements, provide for continuity of operations, and reduce personnel requirements."
TRADOC Pam 525-5
Force XXI Operations

Warfighting and OOTW support afforded by IMA Infrastructure assets leverages optimal readiness, mobilization, and split-based operations capabilities. Under the framework of Power Projection, a seamless information and communications architecture is the conduit for information (logistical, intelligence, medical support, personnel) from the CONUS-based infrastructure to the deployed warfighter via the Army Global Command and Control System (AGCCS). The AGCCS leverages space-based satellite communications assets through which the deployed warfighter has connectivity from the battlefield personal computer back to databases located in CONUS (Figure F-4).

The split-based concept of operations renders a much greater "tooth to tail" ratio for a flexible military strategy based on rapid deployment from the CONUS base. It permits the Army to deploy with only those functional capabilities absolutely required. This strategy facilitates a better warfighter-to-support personnel ratio in the area of operations and is fundamental to the rapid deployment of modular, tailorable, units to any geographic area of operations.

For example, deploying Materiel Management Cells (MMC) rely on CONUS-based information management and communications networks to

provide near real-time electronic transmission of logistics data, message, and voice communications. Secure satellite communications and data processing links from the deployed MMC back to the supporting MMC in CONUS are essential to a national military strategy predicated on Force Projection and split-based operations.

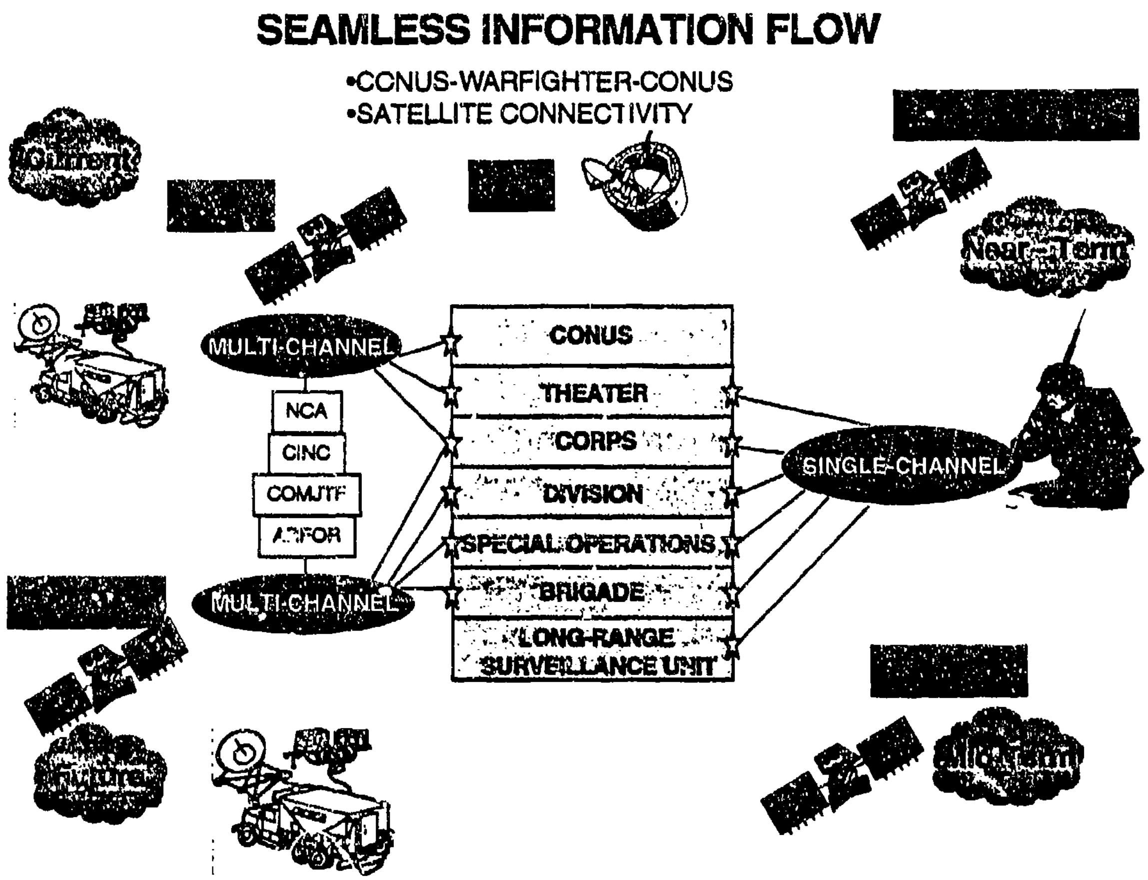


Figure F-4

Long haul communications capabilities are provided by military communications satellite links and commercial satellite assets, which may be required for surge augmentation. These strategic lines of communication provide global connectivity for the deployed peacekeeper or warfighter. The global communications and information grid provides the infrastructure for operational support capabilities.

Information Security (INFOSEC) is a priority issue, and is being addressed as part of the C4I architecture supporting the warfighter. The capability to plug in/plug out of the global communications grid permits the deployed commander to decide and synchronize operational courses of action based on near real time

C2, intelligence, logistics and sustainment information, and common user service, as required.

IMA Infrastructure systems and automated information management capabilities leverage the synchronization of information based operations necessary to conduct complex joint and multinational operations in accordance with information operations doctrine. Standard interfaces for interoperable C4I systems are to be developed and enforced in accordance with the tenets of the C4I For The Warrior (C4IFTW) concept of operations directed by the Joint Chiefs of Staff and the Army Enterprise.

The Goal: A Collaborative Computing Environment

- **Personal workstations & hosts become functional peers**
- **Software programs interact with one another independently and transparently to both application and user**
- **Roles of client and server allocated dynamically based on need and capability**
- **Software services are integrated, interchangeable, and dynamic regardless of platform**

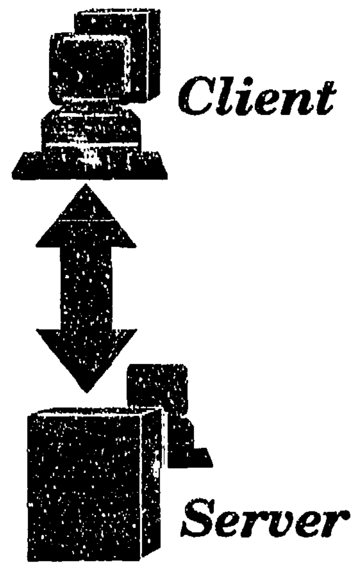


Figure F-5

In addition to supporting combatant C4I needs, multi-functional databases, business applications, and network communications capabilities also support and sustain the warfighter, whether in garrison or deployed. The target architecture for achieving the goal of distributed processing across a seamless, open systems information environment is known as the Client/Server (C/S) architecture (Figure F-5).

The C/S architecture represents a departure from fixed, mainframe based computing environment to one of distributed processing flexibility. C/S based processing and applications enable distributed processing over a network based on a more rational division of labor between centralized and end user computing

services. C/S fosters a highly effective collaborative computing environment and places data in the hands of users cost effectively and quickly. The Army's primary IMA Infrastructure modernization programs are based on the C/S architecture.

The Sustaining Base Information Services (SBIS) program is fielding a suite of modernized, standard applications designed to promote economies in managing and operating the Army's sustaining base. A modern and efficient information management base is essential to leveraging the Power Projection platform capability of Army installations.

One of the key lessons drawn from Desert Storm was that many of the administrative functions previously perceived to be noncombat related were critical to the sustainment of the deployed forces. Automated information management and communications networking capabilities enable split-based operations. Sustainment and management functions related to medical services, payroll, war reserve stockpile and spare parts management, transportation, and legal services, etc. are required for the deployed warfighter or peacekeeper. All these functions were required to equip the forces during the buildup and to sustain high degrees of morale and combat readiness once deployed. Telecommunications services between deployed Commander In Chief (CINC) elements and their CONUS-based support functions at Army installations became mission critical.

Administrative information is important to decisions on force readiness, mobilization and deployability. The commander is compelled to react within a compressed time/operations continuum which is characteristic of information age warfare. The task will become manageable by modern information management and decision support systems. IMA Infrastructure capabilities give the warfighting commander the capability to operate inside of the adversary's information/decision cycle. Information Dominance is a warfighting enabler of the highest order.

WIN THE INFORMATION WAR

"As we develop our mastery of such (information based) operations.... We must develop the protection of these systems and procedures even more rapidly."
TRADOC Pam 525-5,
Force XXI Operations

The IMA Infrastructure supports Information System Security (INFOSEC) which enables warfighters to access and exchange information at needed levels of classification using a single C4I system. Draft *FM 100-6, Information Operations,* categorizes INFOSEC as "passive command and control-protection." INFOSEC protects automated information and communications systems, the software that drives them, and the information that is processed and transmitted. It includes Communications Security (COMSEC) and Computer Security (COMPUSEC).

Both COMSEC and COMPUSEC rely upon a mix of hardware, software, and procedures to protect information as it is manipulated and transmitted among friendly users. For example, INFOSEC assets protect the integrity of friendly information from attacks by malicious software (computer viruses) and from unauthorized access aimed at exploiting or manipulating information within automated information systems.

The warfighter has long faced the challenge of operating simultaneously at many different levels of security. Warfighting CINCs confirm this through exercises and operational planning efforts. Unfortunately, every strategy used to address this challenge has significant drawbacks. Requiring the highest level of trust throughout a system is not acceptable. Mixed levels of trust have resulted in separate and redundant systems, which are often inefficient. Integration of separate systems into a secure network is a force multiplier for the warfighter. It improves the commander's decision cycle.

The objective of a Multi-Level Secure (MLS) operating environment will make the bridging, or interoperability, of C4I systems a secure, trusted reality. An MLS solution for systems already fielded is required so that secure interoperability can be leveraged from significant investment in the existing operational baseline.

The Army's Power Projection strategy also requires the use of commercial telecommunications and information processing systems and networks to provide a global grid. INFOSEC allows us to maximize the benefits provided by these nonmilitary resources. It also ensures the safeguards limiting unauthorized access to commercial networks complement those that protect tactical networks.

In the future, warfighters will have more time to concentrate on the mission at hand, since trusted INFOSEC frees them from the manual and cumbersome procedures associated with security enforcement. INFOSEC provides the technology to give the warfighter universal access to information processed on a single terminal device. INFOSEC technology supports the establishment of a seamless information system architecture linking the deployed warfighter to the Power Projection platform to other components of the Joint Task Force and to the global information system. Furthermore, INFOSEC capabilities contribute to a common picture of the battlefield and a shared situational awareness.

Many challenges must be overcome before emerging INFOSEC technology goes to the field. These include integrating existing systems to achieve more efficient use; requiring new systems to operate with existing, single level security systems, including unclassified systems; and, demonstrating that prospective systems can be trusted to operate securely and efficiently in tactical, operational, strategic, and commercial packet switched networks with no special purpose hardware or software. INFOSEC is key to Winning the Information War.

SECTION 3

CURRENT PROGRAM ASSESSMENT

"We cannot rely on in-theater assets; we must be able to execute power projection logistics....We are investing in our installations...and in information technology to speed processing times and to improve accountability."

GEN Gordon R. Sullivan
Army, Chief of Staff

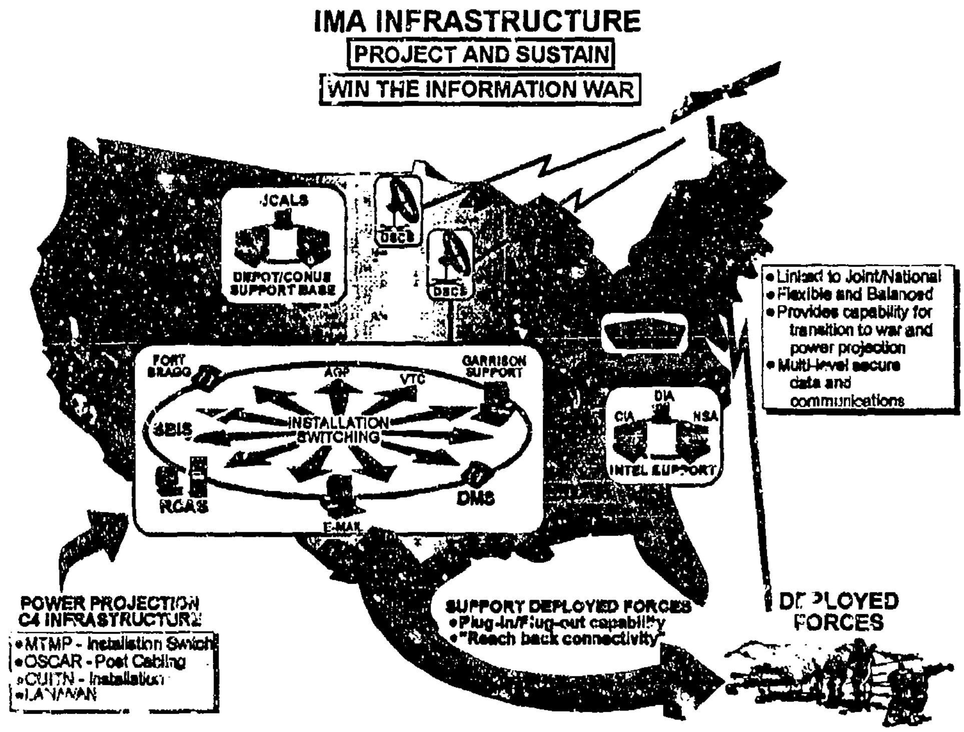


Figure F-6

PROJECT AND SUSTAIN

The IMA Infrastructure program assessment reflects the Army's dedication to modernizing the Force Projection capabilities of Army installations and winning the Information War (Figure F-6).

The following programs are major modernization initiatives for supporting the Army's global information architecture. These programs focus first on modernizing the "backbone" information processing and transfer capabilities vital to the daily operations of MACOMs and installations.

These programs focus constrained modernization resources on those installations from which warfighters must maintain optimum readiness and be able to mobilize and deploy consistent with force package strategy and guidance. The current Army Program Objective Memorandum (POM) supports the IMA infrastructure modernization of those installations supporting the Army's early deployers.

IMA Infrastructure programmed improvements allow the Army to better support the National Military Force Projection Strategy by providing continuous, more responsive information flow from the National Command Authorities to the battlefield. The IMA Infrastructure Modernization Strategy includes the major modernization programs discussed here.

The current program assessments are as follows:

RED -- No capability exists or, is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and

GREEN -- Adequate capability and quantity exists to perform the mission.

Sustaining Base Information Services (SBIS). SBIS initiates the transition of existing Army-wide sustaining base information services to an open systems (non-proprietary) operating environment. This program provides software and hardware for installation and MACOM management applications, supporting base operations, and sustainment functions. Sustaining base functions encompass all information management resources and activities used to plan, organize, train, equip, deploy, control, sustain, and redeploy forces. Approximately 70 application modules will be fielded. Software and supporting hardware are fielded from FY 96 through FY 04, and is sequenced based on go to war support priorities.

COMPONENT	NEAR-TERM (FY95-96)	MID-TERM (FY97-00)	FAR-TERM (FY01-09)
Sustaining Base Information Services	**AMBER**	**AMBER**	**AMBER**

SBIS is **AMBER** for the FY 96-FY 01 program period. The current SBIS funding profile supports development and fielding of 53 out of 70 applications to 43 out of 70 installations over the current POM. This is primarily due to FY 95 Congressional reductions and program restructuring in response to the Joint Applications Development Process.

Power Projection Command, Control, Communications and Computer Infrastructure (PPC4I). PPC4I upgrades telecommunications infrastructure at Army installations in support of the Army's Power Projection strategy. For the program period, PPC4I upgrades the infrastructure at installations which project early forces. PPC4I combines four existing telecommunications infrastructure programs: (1) telephone switch; (2) the outside transmission media cable plant; (3) the backbone data network; and (4) the data gateway to communications networks external to the installation.

PPC4I fielding focuses on CONUS installations to include Alaska and Hawaii. This is the first major upgrade of the Army's telecommunications infrastructure in more than 40 years. PPC4I does not duplicate SBIS or other projects; however, SBIS or other projects may install limited infrastructure components at an installation if fielding occurs prior to the arrival of PPC4I. Coordination will be managed by the Army synchronization task force to ensure these efforts are complementary, non-duplicative, and cost effective. The following four programs are subelements of PPC4I:

Major Army Command Telephone Modernization Program (MTMP). MTMP replaces analog with modern digital technology telephone switches. MTMP is **AMBER** in the near- and mid-terms based upon funding constraints which only permit modernization upgrades at seven installations supporting Force Package 1 (FP1). The program turns **GREEN** in the far-term as modernization of FP1 installations is completed, and subject to the availability of funding, modernization of FP2 installations begins.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Major Army Command Telephone Modernization Program	**AMBER**	**AMBER**	**GREEN**

Outside Cable Rehabilitation (OSCAR). OSCAR replaces obsolete wire cable at Army installations with upgrades and fiber optic transmission media. OSCAR installs modernized transmission media to support MTMP digital switches. OSCAR is **AMBER** in the near- and mid-terms based upon funding constraints which only permit modernization upgrades at seven installations supporting Force Package 1 (FP1). The program turns **GREEN** in the far-term as modernization of FP1 installations is completed and, subject to the availability of funding, modernization of FP2 installations begins.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Outside Cable Rehabilitation	**AMBER**	**AMBER**	**GREEN**

Common User Installation Transport Network (CUITN). CUITN supports automation users by engineering and providing the hardware and transmission media to interconnect users behind the communications gateway interface to higher level communications networks like the Defense Data Network and Defense Information Systems Network. CUITN is **AMBER** in the near- and mid-terms based upon funding constraints which only permit modernization upgrades at seven installations supporting Force Package 1 (FP1). The program remains **AMBER** in the far-term since this is a new program and all infrastructure modernization will not have been completed due to funding constraints.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Common User Installation Transport Network	**AMBER**	**AMBER**	**AMBER**

Army Gateway Program (AGP). AGP supplies software and hardware to connect installation users to the Defense Information Systems Network. AGP is the key to higher DoD level telecommunications connectivity for support of seamless information transfer in a global, joint, and multinational operational environment. For the program period, AGP is **GREEN**.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Army Gateway Program	**GREEN**	**GREEN**	**GREEN**

Reserve Component Automation Systems (RCAS). RCAS provides the Army National Guard and the Reserve Component automation capabilities for daily operations. RCAS is a comprehensive computer system that supports decision making of commanders, staffs, and functional managers responsible for leading and managing Army National Guard and Reserve units. It provides all information required for mobilization, including unit administration and mobilization personnel data management capability. RCAS resides at mobilization stations CONUS-wide and it is open systems environment compliant. A funding shortfall has set back the program. Current funding meets only 51% of the Reserve Component fielding objective through FY 02. This does not meet OSD and Congressional guidance (that calls for complete fielding by

the end of FY 98), and it delays improvements to the enhanced mobilization capability. RCAS is **AMBER.**

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Reserve Component Automation Systems	**AMBER**	**AMBER**	**AMBER**

Joint Computer-Aided Acquisition and Logistic Support (JCALS). JCALS electronically acquires, integrates, and provides access to technical and engineering data required to support development, acquisition, and logistics support of weapons systems. JCALS reduces weapon systems development and deployment time through the use of integrated, automated, logistics technical data. It enhances overall readiness posture by streamlining life cycle support , maintenance, product improvements, and change proposals of fielded weapons systems. The Army is the executive agent for this joint program. Program funding is controlled by OSD and the program is **AMBER** in support of developing a limited capability prototype.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Joint Computer-Aided Acquisition and Logistic Support	**AMBER**	**AMBER**	**AMBER**

Defense Message System-Army (DMS). DMS extends record messaging services from writer to reader via E-mail on a worldwide basis, allowing for closure of obsolete, resource intensive telecommunications centers. The DMS features: (1) user operated service; (2) a single form of message service and simplified message format; (3) multi-level secure message processing through the use of Multilevel Information Systems Security Initiative (MISSI) products as they become available; (4) automated local distribution via information transfer networks; and (5) multifunction workstations for most Army users. The DMS is **AMBER** in the near-term awaiting the approval and award of a contract vehicle for the purchase of DMS compliant components. Mid- and far-terms are projected to be **AMBER** based upon anticipated DMS contract award and the availability of both funding and MISSI products.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Defense Message System-Army	**AMBER**	**AMBER**	**AMBER**

WIN THE INFORMATION WAR (INFOWAR)

INFOWAR has two main categories: Offensive INFOWAR and C2 Protect/Defensive INFOWAR. The key to robust C2 Protect/Defensive INFOWAR capabilities is to have a viable, effective and well resourced INFOSEC program. Information systems security is a key issue in support of the warfighter and assuring readiness of Army forces.

INFOSEC integrates Communications Security (COMSEC); Computer Security (COMPUSEC); and TEMPEST. These technical security disciplines are combined under the Office of the Director of Information Systems for Command, Control, Communications and Computers (ODISC4). The ODISC4 provides support to the development, purchase/lease, and fielding of information systems Army-wide. Information system users are responsible for identifying INFOSEC requirements. Within a Battlefield Functional Area, Program Executive Officers (PEO) and Project Managers (PM) are responsible for planning, programming and funding INFOSEC for intelligence, electronic warfare, computers, communications, command and control, and weapons systems. INFOSEC programs not addressed by PEOs/PMs are planned, programmed, and resourced through the Information Systems Security Program (ISSP).

The need for timely and secure information - from tactical units anywhere in the world to the sustaining base in CONUS - has been increasing. This is due, in part, to increased computer hacker attacks directed at the Army's information systems. As more systems are being developed as part of an open systems environment, and more systems are being accessed by INTERNET, vulnerabilities to Army systems will increase in the coming years.

At the direction of Congress, a Joint Security Commission was co-chaired by the Department of Defense and the Central Intelligence Agency. The Commission's formal report, "Redefining Security," cited the need for increased funding to support information systems security requirements. Army procurement and RDT&E funding, which should have been increased to support the Army's INFOSEC requirements over the POM years, has been cut to the point that the Army can no longer assure INFOSEC through POM years. Consequently, INFOSEC is an Army materiel weakness. INFOSEC must be increased not only to provide for the security of the Army's information systems, but to support joint interoperability with other services and agencies.

INFOSEC Program Assessment:

Electronic Key Management System - TIER 1 (EKMS - TIER 1). EKMS - TIER 1 transitions the DoD from paper-based to electronic Communication Security (COMSEC) Key. This program provides a joint automated system to receive, store and distribute electronic keys and is the

number one priority of OSD for Joint Interoperability. A funding shortfall renders this program **RED** for the program period. There are two sub programs of EKMS:

Army Key Management System (AKMS). AKMS is the Army's portion of the National EKMS. This system electronically generates and distributes key to tactical equipment on the battlefield, removes the dependence on paper key, and increases the flexibility of cryptonetting. AKMS supports secure tactical information transfer and Mobile Subscriber Equipment (MSE). This program is also required for joint interoperability. AKMS is **AMBER** across all timeframes due to limited funding which will permit upgrades to meet about 50% of the Army's AKM requirement.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Army Key Management System	**AMBER**	**AMBER**	**AMBER**

Benign Fill. Benign Fill is applied to existing COMSEC devices by board modification. It adds super cryptosecurity to AKMS by allowing the passing of key in encrypted form end-to-end, reducing the human intelligence (HUMINT) threat. It is OSD's number two priority requirement for joint interoperability. The Benign Fill modification is mandatory for linking encryptors used in joint networks and optional for inter-service networks. The Benign Fill program is **RED** due to nonavailability of any funding. The Army has a requirement to apply this modification upgrade to 25% of existing KG 84 and KIV 7 COMSEC devices (13,500 devices) over the program period.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Benign Fill	**RED**	**RED**	**RED**

Secure Telephone Equipment (STE). The objective STE (a STU-III Type Telephone) will have both digital and analog capability. Starting in 1997, the Army will begin procurement of STEs, dependent on the availability of the tactical capability. The strategy to tactical connectivity provided by the tactical capable STE will correct a deficiency identified in joint and inter-service operations during Desert Storm. All Military Communications and Electronics Board principals have agreed that the services will support the procurement of tactical-capable STEs. This program is OSD's number three priority requirement for joint interoperability. The interim solution is the Strategic to Tactical Secure Voice Terminal (STSVT), a multi-media terminal STU-III currently available through NSA. STE is **RED** in the near-term because it is a new requirement, and there are no resources programmed. The program is **AMBER** in the mid- and

far-terms due to limited availability of funding beginning in FY 97 for purchase of 1720 devices. It is projected that 80,000 devices are required Army-wide during the far-term.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Secure Telephone Equipment	**RED**	**AMBER**	**AMBER**

Multi-level Security (MLS). The MLS system allows users at different security classifications (Unclassified through TS/SCI) to use a single Data Communications Network (DCN) through the use of releasable FIREFLY or equivalent technology. MLS permits the exchange of all classifications of information within the DCN without increasing the probability of compromise. It also allows users without MLS components to exchange information at their authorized level with users who have MLS, thus providing a secure release capability. Two programs support migration to the MLS system objective capability.

Multilevel Information Systems Security Initiative (MISSI). MISSI was designed for DMS security and is well suited to fixed installation operations. Weight, formfit, and lack of mobility make MISSI unsuitable for tactical use. Initially, it will only secure E-Mail traffic with digital signature capability. The MISSI program is the number one priority program supported by the Assistant Secretary of Defense/C3I for the security of the DMS. MISSI is **RED** due to the lack of available components and funding for the purchase of security products.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Multilevel Information Systems Security Initiative	**RED**	**RED**	**RED**

Tactical End-to-End Encryption Device (TEED). TEED is a proof of concept development by the Army for a small, ruggedized tactical device that secures network data transfer of LANs or X.25 packet networks in Mobile Subscriber Equipment or the Defense Data Network. It can be used to support individual or groups of users, and provides authentication plus end-to-end protection for data traffic at all security levels up to TS/SCI. It can function as a tactical MISSI at much lower cost. TEED is **RED** due to lack of any funding to support the program beyond the proof-of-concept stage. A tactical MISSI device is required to support the Army warfighter. There is a requirement for about 70,000 TEED or TEED-like devices to support the warfighter.

COMPONENT	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
Tactical End-to-End Encryption Device	**RED**	**RED**	**RED**

C2 Protect/Defensive INFOWAR is critical to securing the information systems for the Army warfighter and enabling those systems to interoperate with the information systems required for joint, and multinational operations. Additional resources must be identified and programmed to support the INFOSEC mission.

SECTION 4

RESEARCH, DEVELOPMENT & ACQUISITION STRATEGY

IMA technology improvements continue at an exponential rate. Leading edge technologies are expensive. In recognition of these, the acquisition strategy to satisfy the vast majority of IMA Infrastructure requirements continues to rely principally on Commercial Off-The-Shelf (COTS)/Nondevelopmental Items (NDI) solutions. The COTS/NDI alternative is cost effective since leading edge products are already developed, tested, and can be fielded in less time and with less risk. IMA technology improvements are leveraged and inserted as the competitive market place continues to drive the migration to standards, open systems environments, and greater systems interoperability.

The Army's Science and Technology (S & T) program provides a significant adjunct to planning for future requirements and capabilities. S & T findings support IMA architecture decisions to ensure compatibility with the objective of Horizontal Technology Integration (HTI) of systems from the supporting bases to the deployed warfighter.

SCIENCE and TECHNOLOGY

The Army S & T program is directed to provide the technologies, architecture, protocols, standards, mathematical algorithms, and software for integrating the computational, information storage and retrieval, and communications assets throughout the hierarchical structure of a battlefield. Resultant products will promote the migration of task force operations into a seamless, user friendly synthetic environment in which all C4 functionality will be carried out, assisted by artificial intelligence expert systems. This includes highly automated operational planning, rehearsal, and execution with real time command and control, using electronic maps, resource availability data, intelligence information, and operational procedures together with operational concepts and guidelines provided by human C4 management.

Emphasis is placed on establishing the C4 substructure of the Electronic Battlefield to provide fast and situational adaptive tactical mission planning with optimal use of resources throughout the hierarchical structure of the task force. Additionally, it supports mission rehearsal of force components in a synthetic environment that generates the most likely battlefield situations, and automation assisted mission execution able to quickly adjust mission plans to battlefield changes. The architects of the IMA Infrastructure have a vital interest in the findings of this program.

Timely analysis of these findings will facilitate IMA planning; and assure effective horizontal integration of the IMA Infrastructure with the digitized battlefield.

In addition to S & T efforts to directly support the battlefield C4 environment, research projects are underway to enhance IMA operations in support of the deployed forces. These programs investigate a broad spectrum of topics, from satellite communications and automation aids for recordkeeping to practical methods for assuring interoperability between tactical and commercial communications systems.

DEVELOPMENT AND ACQUISITION

"Information technology is expected to make a thousandfold advance in the next 20 years. In fact, the pace of development is so great that it renders our current materiel management and acquisition system inadequate."
TRADOC Pam 525-5,
Force XXI Operations

Acquisition strategies that favor COTS/NDI equipment (hardware with embedded software) will provide near-term solutions to requirements as well as be the foundation for future planned product improvements. Equipment must support the Open Systems Environment (OSE) and be compatible with existing systems. Equipment which meets OSE requirements eliminates wedding to proprietary technology, and potentially higher life cycle support costs and the limits to future system expandability this could impose. Compatibility with existing systems will allow selective upgrades of systems as state of the art advancements offer performance improvements. COTS/NDI components and systems will continue to migrate to the tactical level, thus ensuring seamless interfaces with the sustaining base.

SOFTWARE

To reduce the cost of software development, acquisition, and life cycle management, software engineering will be carried out in an Integrated Computer Aided Software Engineering (ICASE) environment and will also use COTS/NDI to the maximum extent. All new software acquisitions will be open systems environment compatible with existing systems to ensure interoperability. The requirements for applications and embedded software have grown steadily. During the past 25 years, the volume of software in helicopter systems has increased by a factor of 100. Examples of this growth is depicted in Figure F-7. Likewise, the complexity and real time requirements of software have grown, creating a marked effect on the resources required to design and develop software.

Software Growth in Systems

(REPRESENTATIVE SYSTEMS)

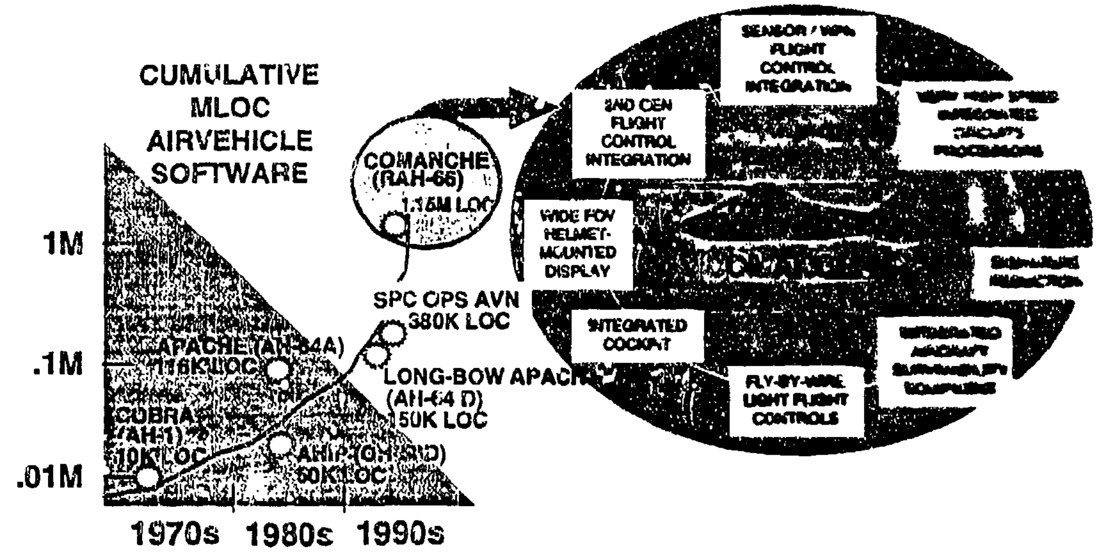


Figure F-7

Policy and procedures are under development to ensure cost effective implementation of software engineering requirements. The draft Army Software Reuse policy serves to ensure reusable principles in software design and development. This will leverage economies that allow other programs to reduce development costs and schedules. Strict adherence to data standards will greatly reduce interoperability problems between similiar systems. The use of ICASE tools enables efficient management and development of large scale systems while providing effective means to perform software maintenance.

The draft Army policy on software life cycle process, based on business case analysis, provides guidance on the most cost effective means to develop, field, and support Army software and standard DoD developed software. Other policies are already in effect. Such policies guide system developers throughout the Army as they strive to meet the Force XXI objective of achieving Horizontal Technology Integration (HTI) among systems that support efficient information transfer between the sustaining base and the deployed force.

BATTLE LABS AND HORIZONTAL TECHNOLOGY INTEGRATION (HTI)

In an environment characterized by a less recognizable threat coupled with austere fiscal constraints, the Department of Defense has set the stage for the military services to explore and evaluate new technologies which will provide leap ahead capabilities for existing weapons and information/ telecommunications systems. In the Army, this is manifested in the Battle Labs, where solutions to requirements are explored and evaluated for technology insertion opportunities. Battle Labs focus on opportunities for HTI across battlefield operating systems so weapons and information systems, operating together, can generate battlefield synergy in joint and multinational operations.

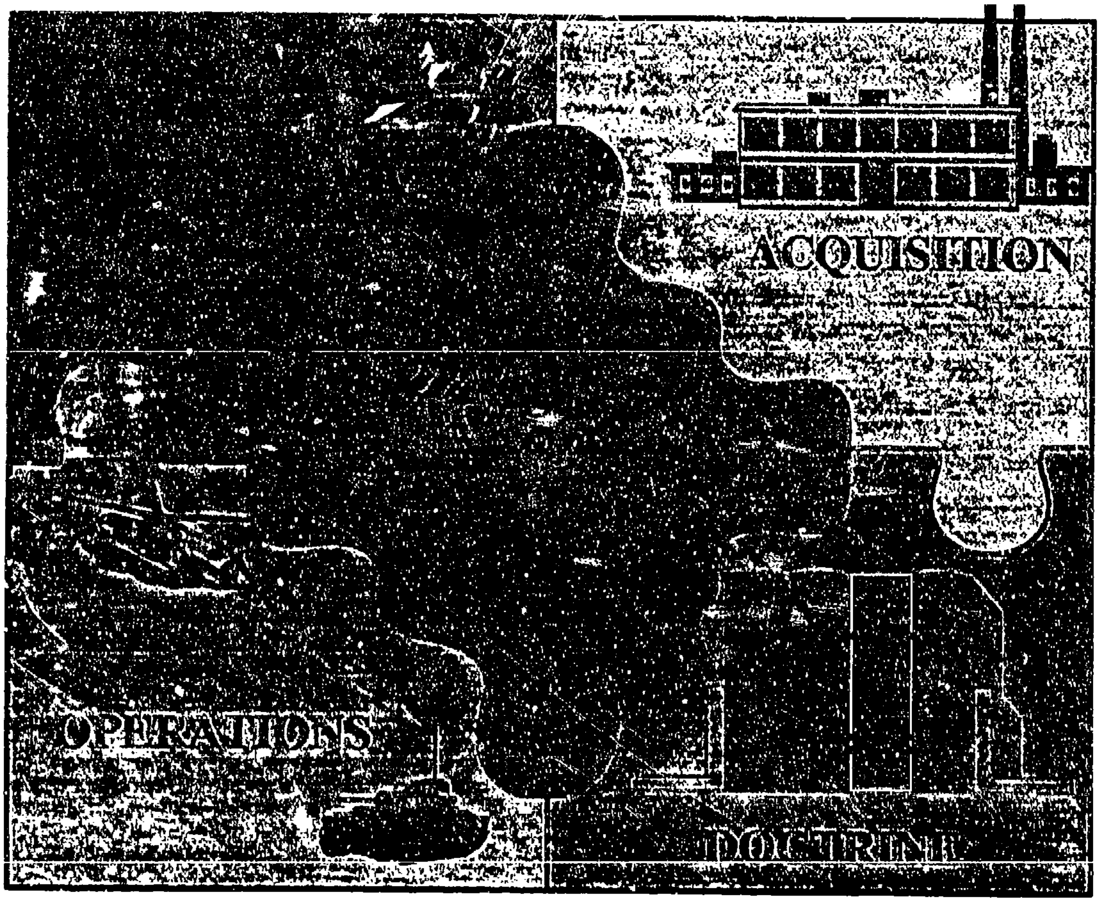


Figure F-8

Battle Labs exploit leading edge technology by "wargaming," Advanced Technology Demonstrations (ATDs), and Advanced Warfighting Experiments (AWE) (Figure F-8). Prototype Force XXI capabilities will be developed through modeling and simulation among the networked Battle Labs. Virtual prototyping of warfighting systems and capabilities is planned to demonstrate the value of HTI without entering into expensive and protracted RDA cycles.

This methodology will also guide Army materiel developers to the best NDI/COTS materiel solutions because industry will be involved in Battle Lab exercises. Promising leap ahead technologies will be evaluated for further materiel development so such capabilities can be integrated into the warfighting force and fielded as developing doctrine and available resources permit.

Technologies and functional capabilities germane to the IMA Infrastructure will enable the Army to meet Force XXI objectives. Robust communications infrastructure and connectivity are key factors. Powerful three dimensional graphic workstations in conjunction with high bandwidth capacity telecommunications will link Battle Labs and simulation centers. Using very high data rate connection protocols, widely dispersed multimedia workstations will be linked to the distributed interactive simulation network. The Distributed Simulation Internet currently provides a level of simulation support. The Army is engaged in developing an enhanced simulation capability known as the TRADOC Simulation Internet. This will enhance Battle Lab connectivity required to operate in the national distributed, interactive simulation environment.

SECTION 5

TRAINING

"The leaders of 2010 must, and will, be masters of information technology."
GEN Gordon R. Sullivan
Army, Chief of Staff

The modern Army requires qualified military and civilian information resource managers who can manage the technology and capabilities of the IMA Infrastructure and who are committed to support the functional users. The continued merging of the six IMA disciplines (automation, communications, visual information, records management, publications and printing, and library management) and underlying technologies make it incumbent upon the Army to recruit, train, and employ skilled military and civilian information managers and technicians at all levels of the Army. IMA curricula at DoD, Army, the Senior Service Schools, and participating colleges and universities support the cadre of civilian and military professionals and leaders required to transition the Army into the information age.

Skills associated with the development, operation, and maintenance of information systems change rapidly. Through the use of embedded training capabilities, such as on-line training tutorials and computer assisted instruction, functional users become more responsible for their training and proficiency in software application programs. The historical training, education, and career development distinctions between automators, communicators, visual information managers, records managers, and library managers continues to blur as associated technology and management requirements become more integrated.

Both Career Program 34 and the Signal Center curriculum at Fort Gordon, GA are dedicated to training and developing the civilian and military personnel who will lead and support the Army's information age transition. The IMA Infrastructure training and professional development community continues to:

- Recruit and retain qualified civilian and military information technology managers and specialists;

- Provide enhanced IMA leadership qualities;

- Provide state of the art training; and,

- Provide trained civilian and military IMA professionals to the Army Acquisition Corps.

Figure F-9 portrays the Information Management Training Model. Both civilian and military personnel are provided the training modules offered by the Triple Track model. The Army Management Engineering College is in the process of revising the IMA curriculum and is developing five new courses. AMEC has trained, in residence and on-site, over 2,500 individuals in the concepts and management skills required of information managers.

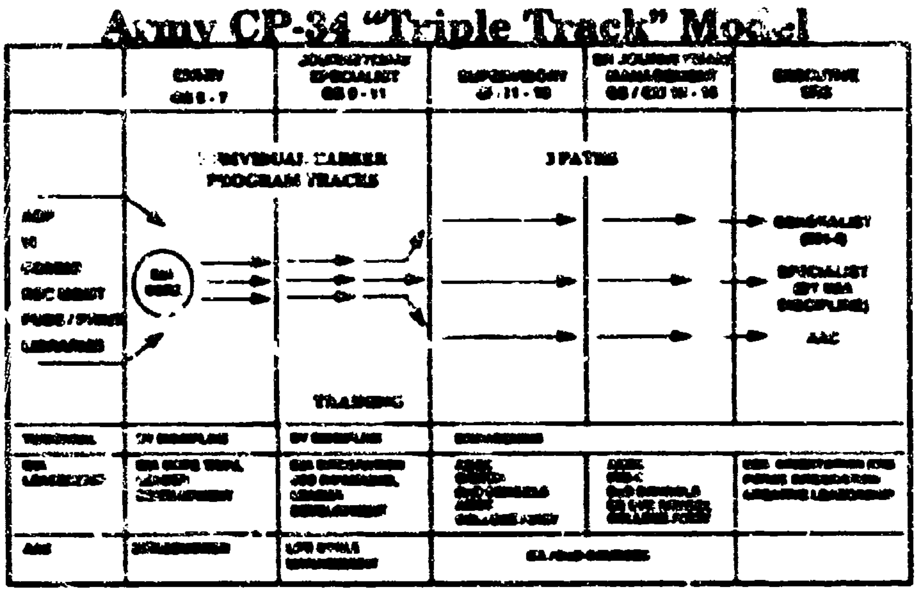


Figure F-9

Executive Leadership Development

Executive leadership development is planned and provided by the Army Executives for Software (ARES) program and the Executive Information Systems Seminar (EISS). ARES provides military and civilian executives an awareness of the impact of information technology on the overall success of the Army mission given the ever growing dependence on computer systems and software as a force multiplier. EISS provides executives a macro perspective of the roles of information, information systems, and communications in the current and future defense environment.

A recently introduced training program, the Information Warfare curriculum at the National Defense University, will continue development in concert with evolving doctrine. Information Warfare/Operations is a focal area for the enabling technology and management skills being developed within the IMA training base.

For detailed information on Army-wide training initiatives and issues, consult Annex R to this Plan.

SECTION 6

CONCLUSION

The information age is exerting powerful influences on all domains of military requirements and operations. The power of the microprocessor and the accelerating tempo of telecommunications propel change at unprecedented velocity. Land warfare is being redefined by paradigm shifts articulated by the goals of Force XXI.

Modernization of the IMA Infrastructure enables the Army to better function and manage itself across the Force XXI range of military operations, from OOTW to war. The Army Enterprise assures IMA modernization goals complement Force XXI and support the plans and doctrine for the 21st Century Army.

The Army has a great stake in the exploitation of advanced information technology. Information Dominance is both a potent deterrent to conflict and the pre-eminent force multiplier on current and future battlefields. The global information environment is where the execution of information operations in support of knowledge based warfare will occur. IMA Infrastructure modernization is a key enabler of the information age, Power Projection Army, and Winning the Information War. IMA Infrastructure capabilities must be adequately resourced to leverage the Information Dominance required by the Force XXI Army (Figure F-10).

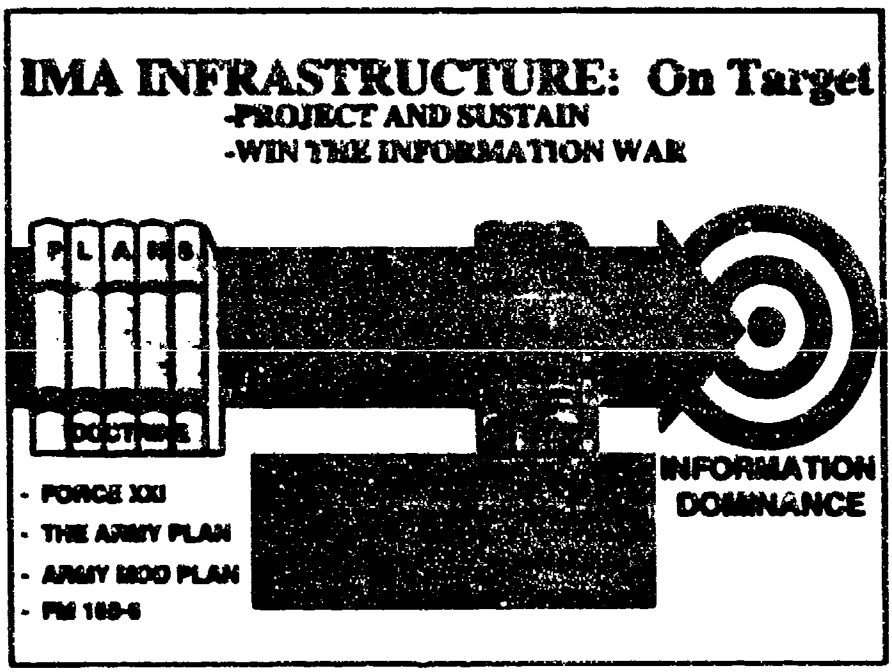
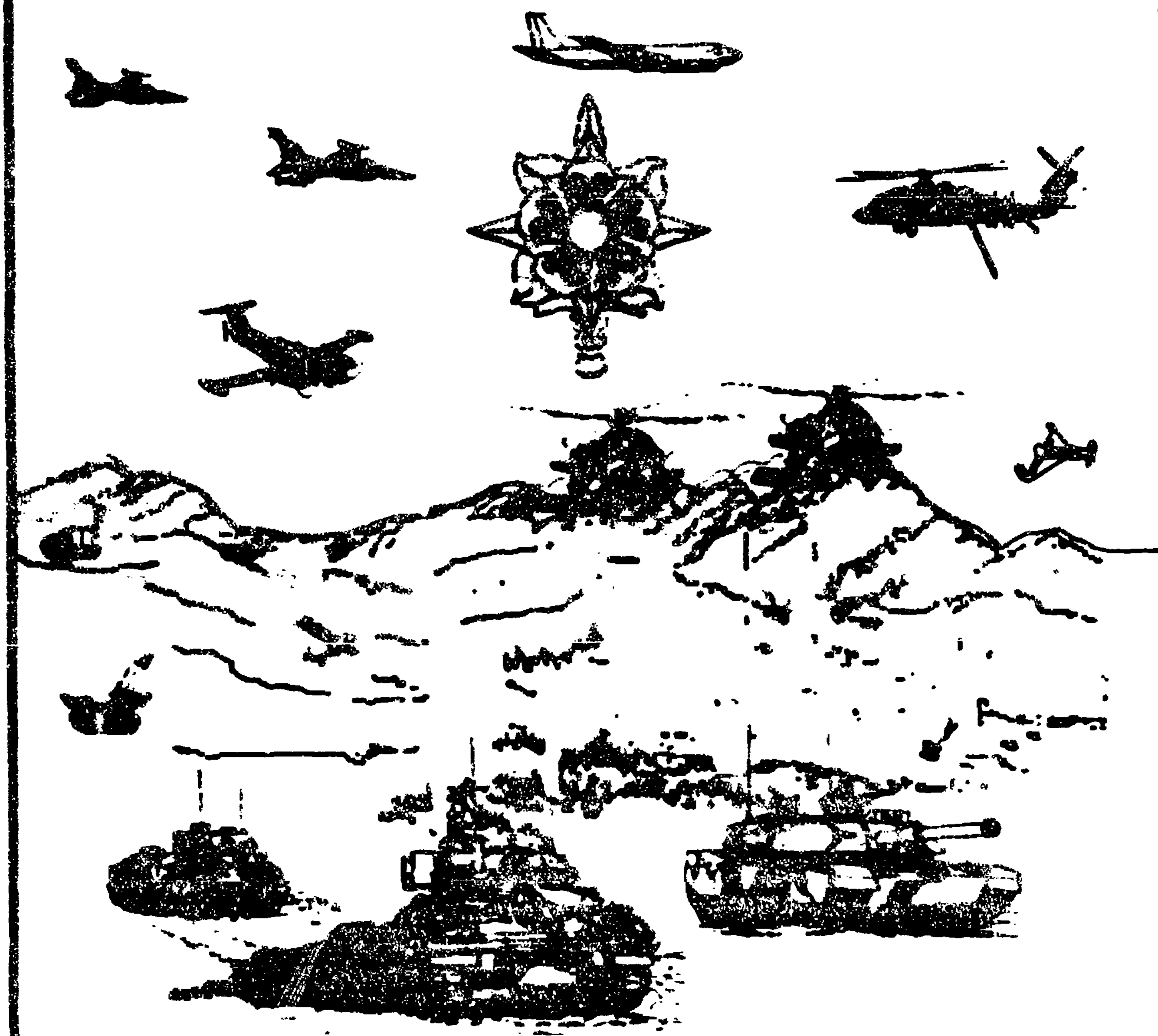


Figure F-10

ANNEX G

INTELLIGENCE AND ELECTRONIC WARFARE



ANNEX G

INTELLIGENCE AND ELECTRONIC WARFARE

SECTION 1

INTRODUCTION

The overriding objective of the National Military Strategy remains the deterrence of aggression--should deterrence fail, to fight and win decisively. This reality continues to drive the development of military forces. Changes in the world security environment have shifted our focus from global war to regional threats to U.S. interests.

The evolution of U.S. National Military Strategy to focus on regional threats and the redeployment of large portions of the Army to CONUS bases has resulted in a Power Projection Army. This period of evolution has witnessed significant changes for the IEW Battlefield Operating System (BOS). This chapter and the supporting Army Intelligence, Electronic Warfare, and Target Acquisition Master Plan (AIMP) have articulated a coherent vector for the evolution of Army Intelligence. A new family of systems has been developed that takes advantage of commonality, interoperability, and open architectures. The Chief of Staff, Army (CSA), has approved a new Military Intelligence Operational Concept and attendant doctrine and also approved the Force Design Updates for MI Battalions at division and MI brigades at corps level. Further, echelon above corps (EAC) Military Intelligence power projection brigades are being created to support worldwide contingencies. Despite these changes, the critical capabilities needed to support a power projection army have been retained. Army Intelligence is positioned to evolve to the information age intelligence system of systems needed to support Force XXI.

New strategic conditions and the intelligence requirements of a power projection army have forced new realities upon the IEW BOS. These are reflected in Figure G-1.

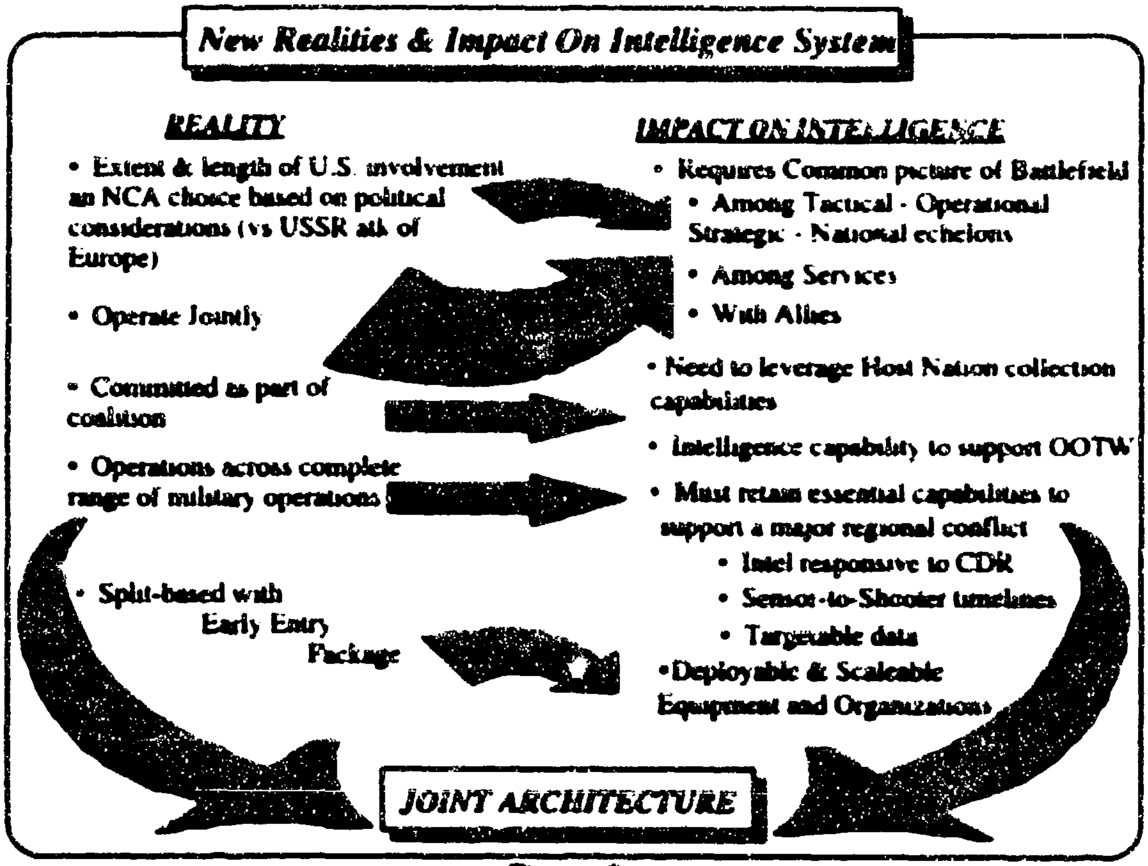

New Realities & Impact On Intelligence System
REALITY
• Extent & length of U.S. involvement an NCA choice based on political considerations (vs USSR atk of Europe)
• Operate Jointly
• Committed as part of coalition
• Operations across complete range of military operations
• Split-based with Early Entry Package
IMPACT ON INTELLIGENCE
• Requires Common picture of Battlefield
• Among Tactical - Operational Strategic - National echelons
• Among Services
• With Allies
• Need to leverage Host Nation collection capabilities
• Intelligence capability to support OOTW
• Must retain essential capabilities to support a major regional conflict
• Intel responsive to CDR
• Sensor-to-Shooter timelines
• Targetable data
•Deployable & Scaleable Equipment and Organizations
JOINT ARCHITECTURE

Figure G-1

SECTION 2

WARFIGHTING CONCEPT

Five MI doctrinal imperatives to support the warfighter can be derived from the Army's capstone doctrinal manual, FM 100-5: the commander drives intelligence, intelligence synchronization, broadcast intelligence, split-based operations, and tactical tailoring (Figure G-2). Intelligence must be synchronized with the operational concept and battle plan to ensure that the commander's requirements are satisfied. Intelligence must be rapidly disseminated to all users through broadcast nets. Tactical tailoring of Intelligence and Electronic Warfare (IEW) units must support missions across the range, from Operations Other Than War (OOTW) through Major Regional Conflict (MRC). Intelligence must support split-based operations stemming from Force Projection, and reduce the number of American soldiers in harm's way. IEW systems are critical to Winning the Information War and disseminating intelligence in real time to tactical commanders. To assure success, intelligence must be focused by tactical commanders and be integrated across joint, multinational, and national level agencies.

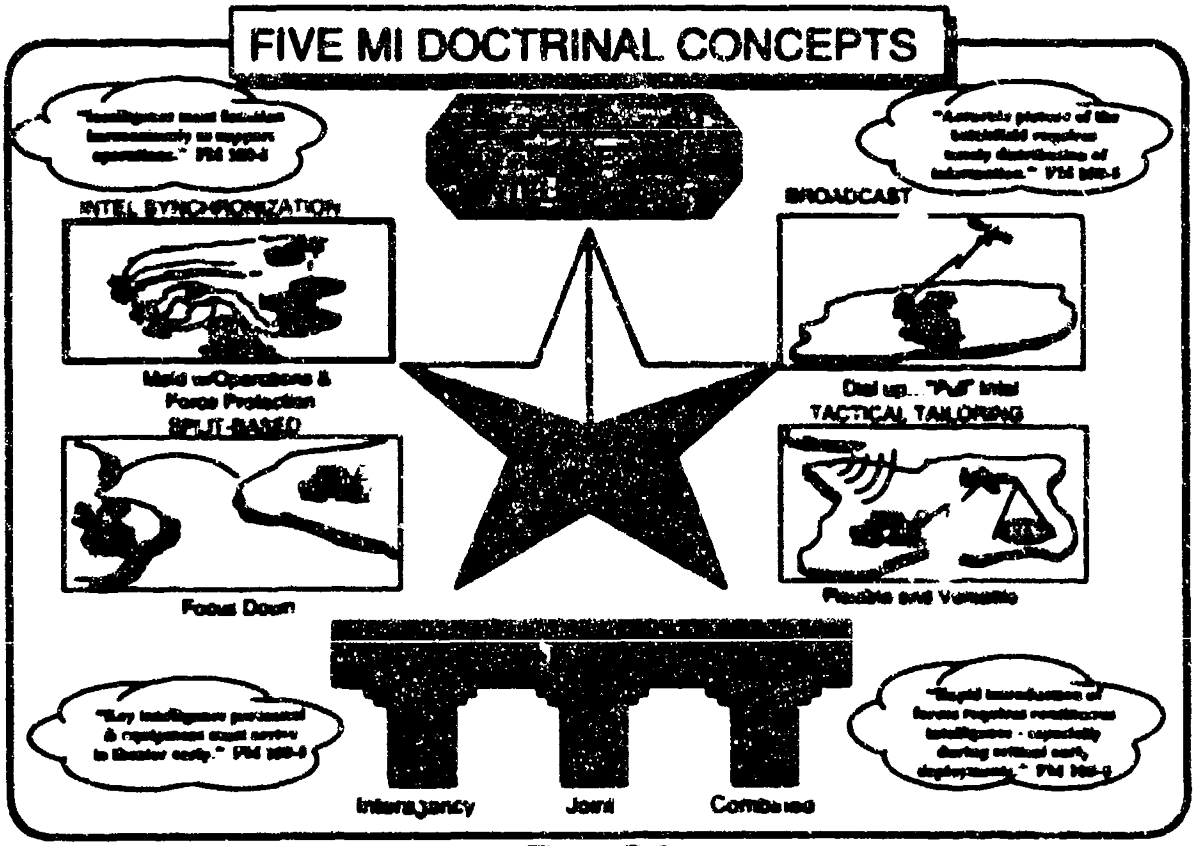


Figure G-2

Increased Emphasis on Jointness

The nature of modern warfare compels the Army to plan and fight as a member of a joint team. Desert Shield/Storm and more recent military operations have reaffirmed this concept. The Army integrates its efforts with its sister Services, with other national agencies, and more frequently with allied and coalition forces. In so doing, the Army's operational capabilities are enhanced; victory comes quicker; and friendly casualties are reduced.

Likewise, the IEW operating system is integrated with the maneuver control, fire support, communications, and command and control operating systems to enable commanders at any echelon to accomplish their missions. Furthermore, the Army's IEW is integrated with joint, theater, and national intelligence systems to enhance the JTF commander's capability to meet the challenges of the 21st Century (Figure G-3). In each IEW program, Army program managers are addressing the technical specifications of how their system will exchange databases and products with sister Services and national IEW equipment. Communications, format, and protocol interoperability are key aspects of Army IEW modernization.

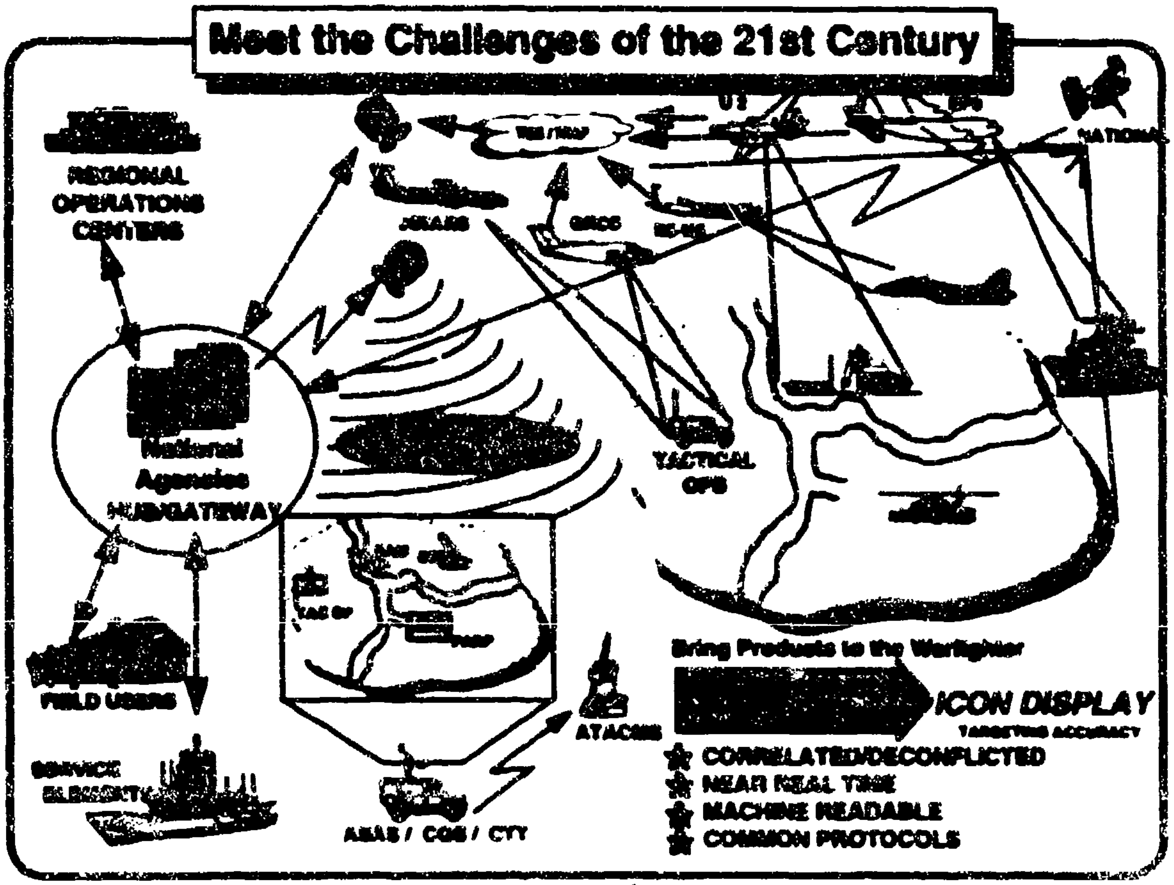


Figure G-3

Within the joint and multinational arena, the Army's IEW systems simultaneously support the close, deep and rear operations. Warfighters require intelligence information that is fused, processed, tailored, focused and timely (Figure G-4). The Army Intelligence BOS has invested a tremendous amount of time and effort to determine the operational procedures and linkages required to obtain timely data from Air Force, Navy, and Marine sensors for Army forces in theater. Conversely, Army IEW has also invested time and effort to provide data from Army and national sensors and processors to Air Force, Navy, and Marine forces.

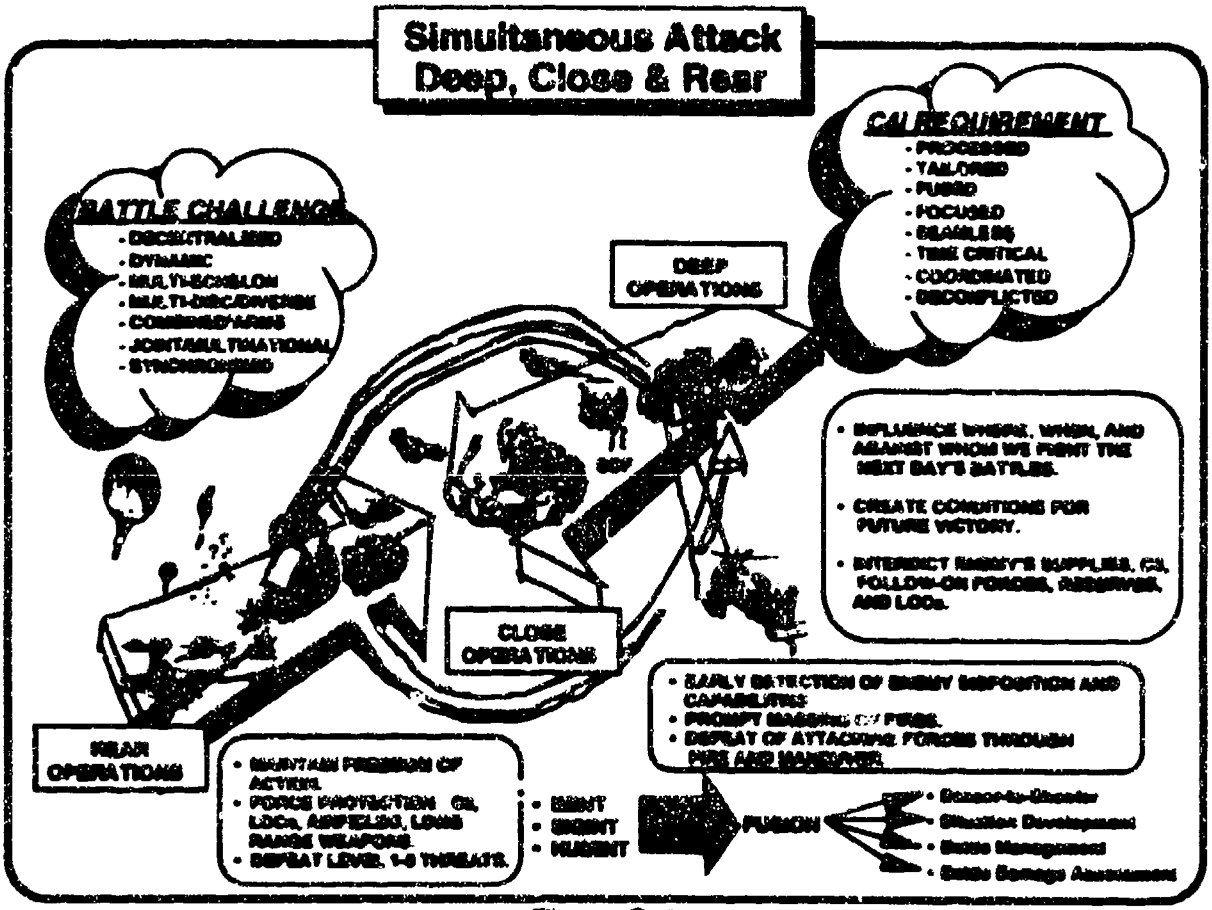


Figure G-4

21st Century Battlefield

We have a vision of the 21st Century battlefield. Figure G-5 shows how we will integrate our system of systems on the future joint battlefield with theater and national assets to create a seamless intelligence architecture.

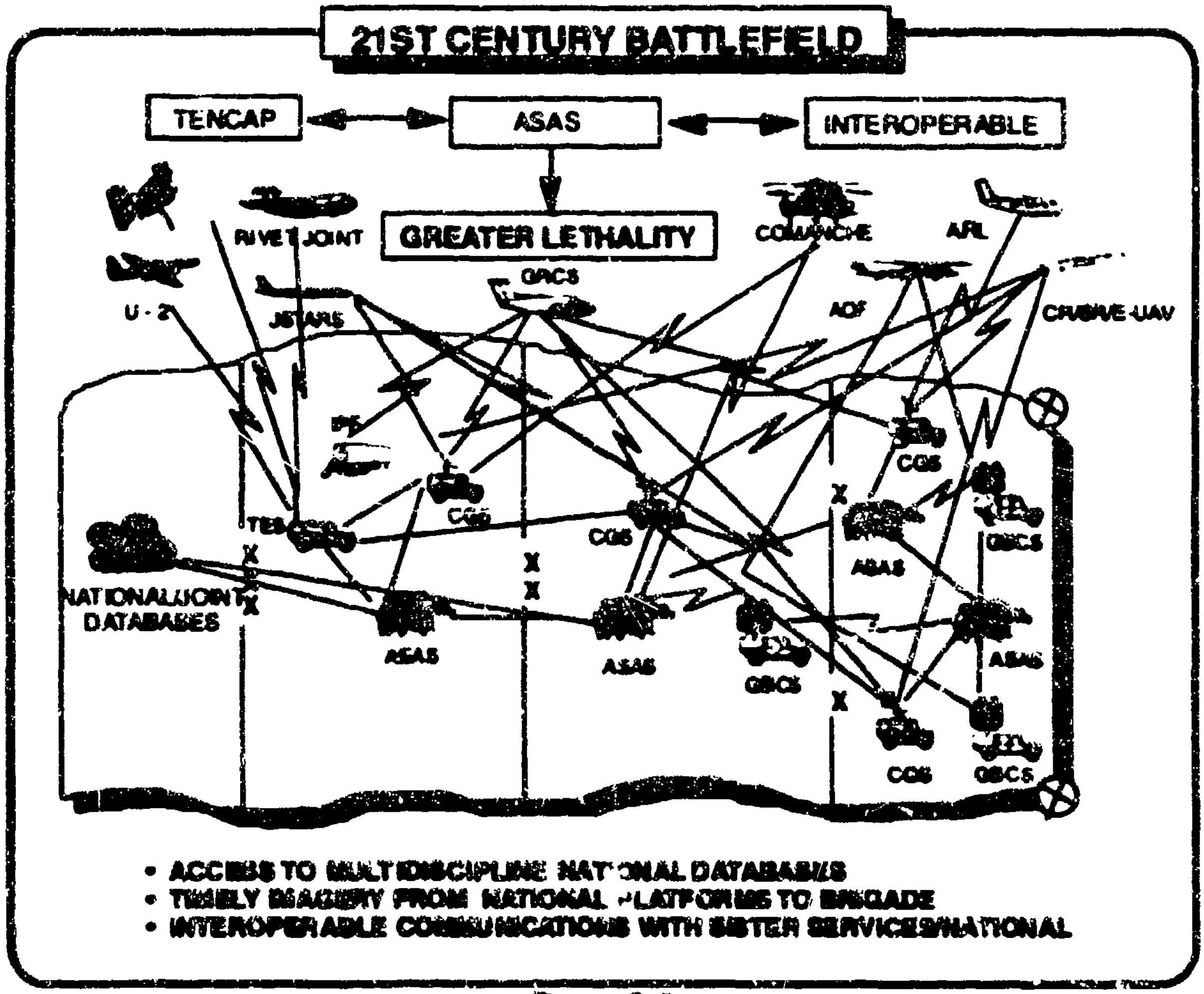


Figure G-5

Equally important, we have a plan to modernize the IEW BOS to realize the vision. The Army Intelligence, Electronic Warfare, and Target Acquisition Master Plan (AIMP), when implemented, "teams" IEW individual systems throughout the requirements spectrum from collection through dissemination.

Figure G-6 represents our objective architecture of the Army systems to be integrated with our sister Services and national system so as to provide timely, actionable intelligence to the JTF or Land Force Commander.

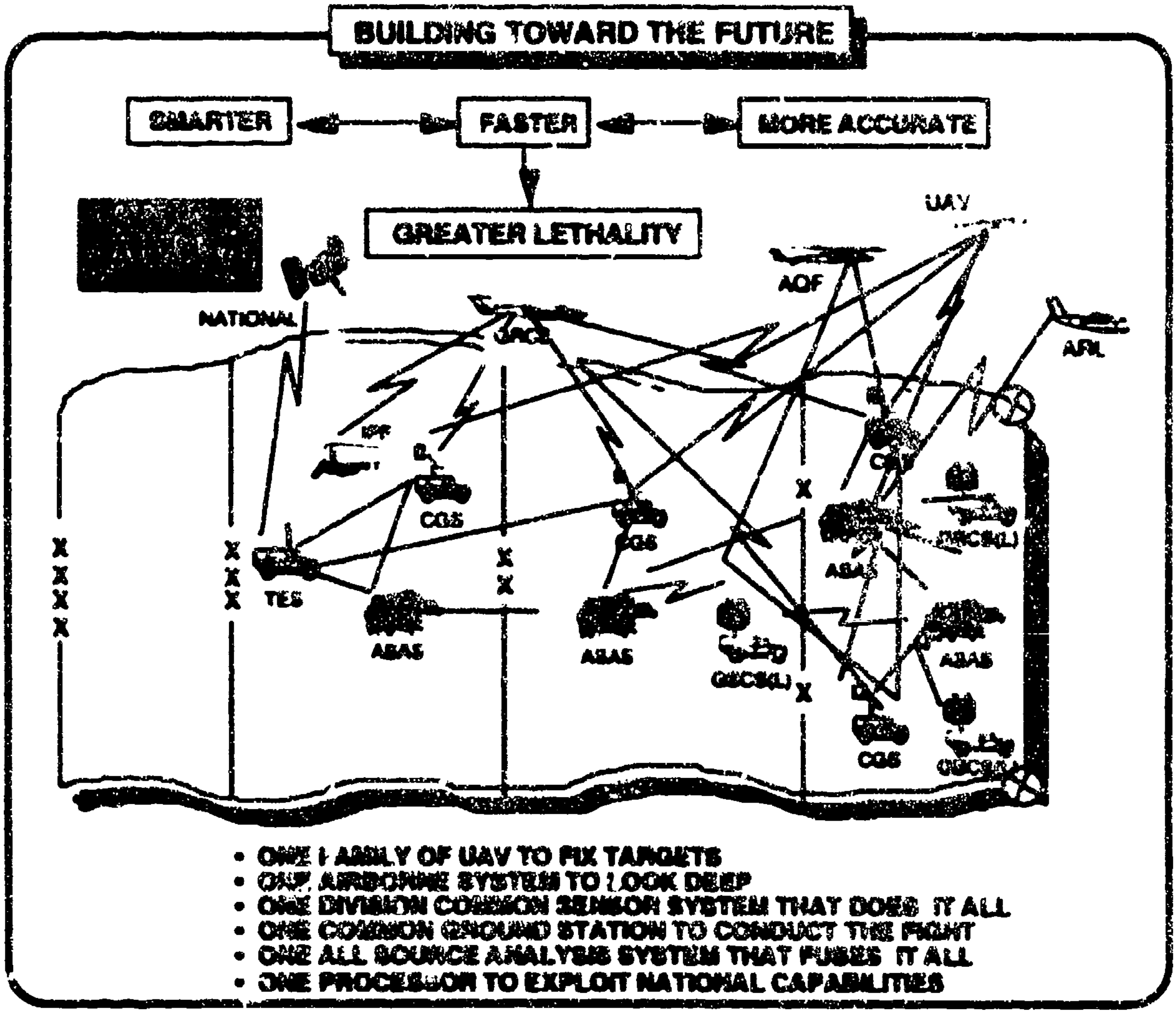


Figure G-6

SECTION 3

CURRENT PROGRAM ASSESSMENT

We intend to reduce the number of systems, yet be more capable as a result of leveraging technologies. This section addresses categories of effort and the plan to migrate current systems to the objective architecture of 2000+. A program assessment of **RED**, **AMBER** and **GREEN** is also included:

> **RED** -- No capability exists, or is insufficient to defeat the threat or provide the required support;
>
> **AMBER** -- A limited capability or quantity exists to perform the mission; and
>
> **GREEN** -- Adequate capability and quantity exists to perform the mission.

ONE FAMILY OF UNMANNED AERIAL VEHICLES (UAV) TO FIX TARGETS

The family of UAVs enables commanders at every level to control their fight. The Close Range UAV (CR-UAV) (also known as Maneuver Variant), First Unit Equipped (FUE) in FY 98, provides targeting, force protection and situation development directly in response to the brigade/Task Force (TF) commander. The Short Range-UAV (SR-UAV) (also known as Hunter), FUE with prototype in FY 96, supports the division fight out to 150 km and the corps battle out to 300 km. Endurance-UAV provides theater commanders with wide area surveillance assets that loiter over the battlefield for extended periods of time at greatly extended ranges.

Each of these programs is described separately in subsequent paragraphs, but all are necessary parts of an entire family of UAVs.

CR-UAV Program Objective/Warfighting Impact

- CR-UAV provides reconnaissance, surveillance, target acquisition, and Battle Damage Assessment (BDA) beyond the FLOT with a range of 50 km (three hour endurance) from a Ground Control Station (GCS).

- CR-UAV supports the brigade/TF fight. It provides real time, day/night, targetable video directly to the brigade/TF commander within his area of operations. A mix of CR-UAV and SR-UAV is less costly (on the order of tens of millions) and less personnel intensive than the SR-UAV alone.

- Description. The CR-UAV baseline system consists of four aircraft with EO/FLIR payloads two downsized GCS two ground data terminals, and one remote video terminal.

• Basis of Issue. Five baseline systems per light division and ACR(L); three baseline systems per heavy division, ACR(L), airborne and air assault division; and one baseline system per separate brigade.

SR-UAV Program Objective/Warfighting Impact

• SR-UAV can penetrate deep (up to 300 km) and loiter long (eight hours) to identify and track high payoff targets for the division and corps.

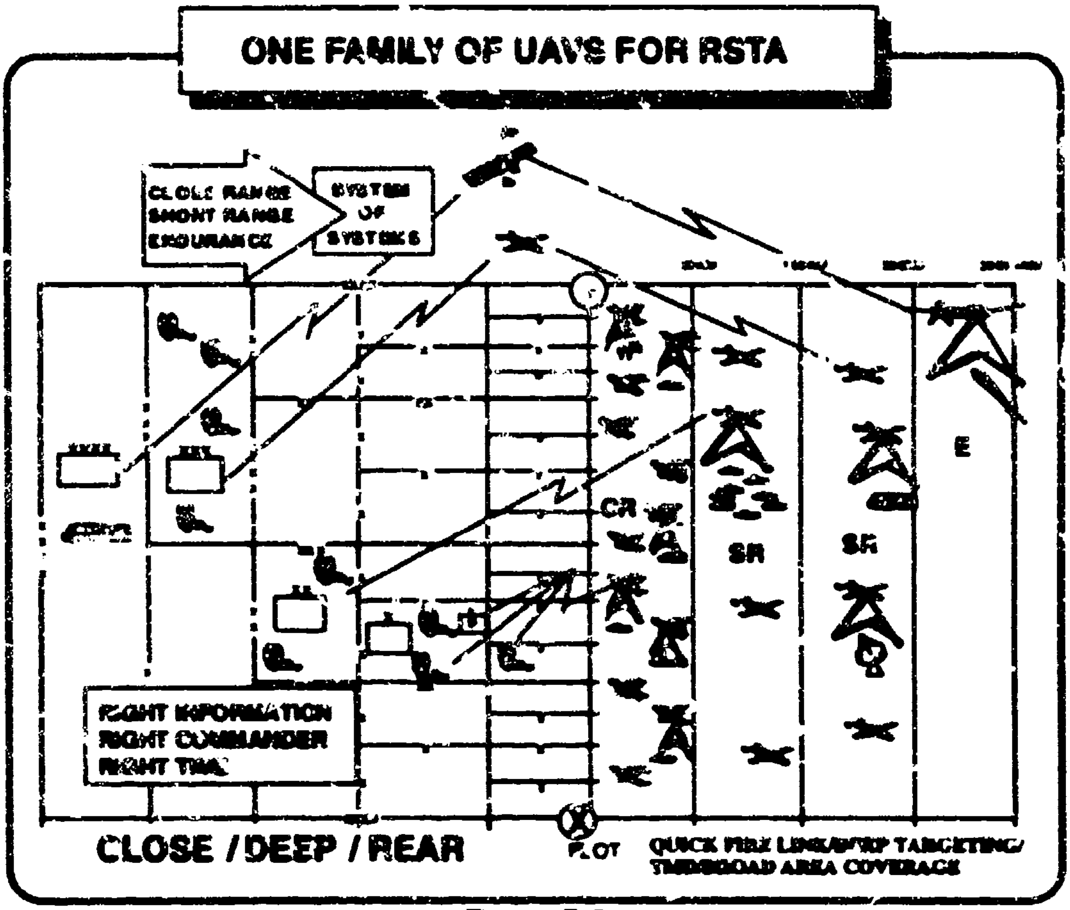


Figure G-7

• SR-UAV is a critical component of the division and corps commanders' deep fight. SR-UAV is cued by other sensors to confirm high value target locations, providing day/night targetable RSTA within the corps and division area of operations. Additionally, SR-UAV is a primary source of battle damage assessment.

• Description. A baseline SR-UAV system includes eight air vehicles with Electro-Optic/Infrared (EO/IR) sensors, four Remote Video Terminals (RVT), four data relay payloads, two GCS, one Mission Planning Station (MPS), and one launch/recovery system.

- Basis of issue. Two baseline systems per corps and selected theater MI brigade and one baseline system per heavy, airborne, and air assault division and one per heavy ACR.

Endurance UAV (E-UAV) Program Objective/Warfighting Impact

- E-UAV provides JTF and theater commanders deep targeting, RSTA, and broad area coverage capability.

- The system will provide over 48 hours on station, greater than 2000 km range with aircraft E-O/IR/SAR payload, and imagery control through satellite relay.

- Basis of issue. Two systems per power projection MI brigade.

One Family of UAVs Assessment

UAV ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
CR-UAV	**RED**	**AMBER**	**GREEN**
SR-UAV	**AMBER**	**AMBER**	**GREEN**
E-UAV	**RED**	**RED**	Unknown

- CR-UAV is **RED** in the near-term because no capability exists now. It becomes **AMBER** in the mid-term with fielding to the Contingency Force from FY 98 until FY 03. CR-UAV is **GREEN** in the far-term with the completion of Active Component fielding by FY 06.

- SR-UAV is **AMBER** at present because only prototype systems are in the field; **AMBER** in the mid-term since fielding to the Contingency Force is completed in FY 01; and **GREEN** in the far-term because fielding will be completed in FY 04.

- E-UAV, currently in Advanced Concepts Technology Demonstration is **RED** in both near-term and mid-term. The timeline, costs, and production schedule for the far-term system have not yet been determined by the Joint Program Office.

ONE AIRBORNE SYSTEM TO LOOK DEEP (Special Electronic Mission Aircraft - SEMA)

The Army is on schedule to migrate RV-1D (ELINT) airborne collectors with the Guardrail V COMINT airborne collector to achieve both capabilities on one aircraft--the Guardrail Common Sensor (GRCS).

An ORD for the next generation of airborne collectors (Aerial Common Sensor) is approved and consistent with the future airborne architecture being developed and supervised by the Defense Airborne Reconnaissance Office.

Airborne Reconnaissance Low (ARL) plays an increasingly important role in OOTW. Its low profile, long legs, and "host nation friendly" operational capability provide great flexibility. Additionally, the modular nature of ARL sensor packages provides for the dynamic modification of collection capabilities in response to conflict escalation. ARL is both SIGINT and IMINT capable and will continue to integrate other developing sensors (for example, Moving Target Indicator [MTI]) to maintain its role as a multi-function aerial platform.

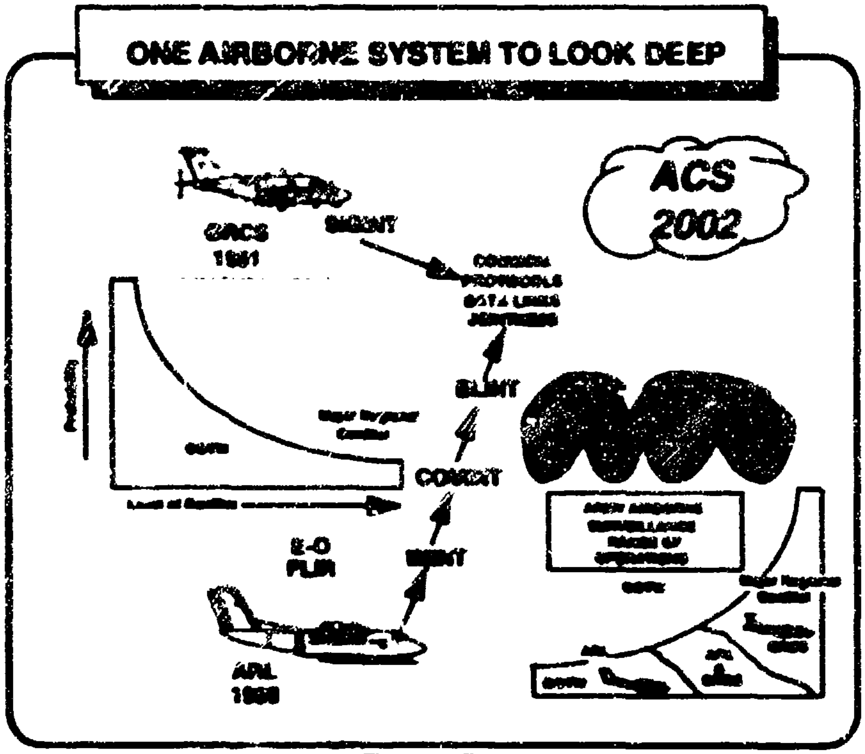


Figure G-8

GRCS Program Objective/Warfighting Impact

GRCS integrates COMINT, ELINT, and Direction Finding (DF) in a single system that provides targetable information to ground components or task force commanders.

- The objective GRCS may deploy early in a Force Projection operation and send collection to CONUS for analysis via a satellite relay.

- GRCS provides the airborne SIGINT DF collection portion of the Common Ground Station picture.

- Description. Principal GRCS components are the Airborne Relay Facility (ARF), Interoperable Data Link (IDL), Integrated Processing Facility (IPF), Commander's Tactical Terminal (CTT), and the CHALS-X SIGINT DF package. CHALS-X provides DF information with targetable accuracy. The IDL transfers DF information between the aircraft and IPF for processing, and processed intelligence reports between the IPF, aircraft, and CTT for dissemination and exploitation.

- Basis of issue. A total of four GRCS systems will be fielded with one system each to III Corps, V Corps, XVIII Corps and I Corps (Korea). An objective set consists of 12 aircraft with associated ground support and processing equipment. Objective distribution of CTT is 27 sets per corps, 10 per division, six per ACR, and two per separate maneuver brigade.

ARL Program Objective/Warfighting Impact

- ARL integrates multiple sensors aboard a nonmilitarized DeHavilland aircraft, providing a low profile airborne platform that is self-deployable worldwide.

- ARL is the only SIGINT platform able to integrate host nation intelligence personnel in its operations, making ARL ideal for OOTW and unconventional warfare environments.

- The ARL program provides six multi-sensor systems which combine infrared/electro-optical sensors with direction-finding and intercept radios, covering the HF, VHF, and UHF bands.

- Basis of issue. Objective distribution of ARL is nine aircraft to INSCOM's Force Projection brigade. Only six aircraft are funded at this time.

One Airborne System to Look Deep Assessment

AIRBORNE SYSTEM ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
GRCS	AMBER	AMBER	AMBER
ARL	AMBER	AMBER	AMBER

- GRCS is AMBER for all time frames. Near-term program funding level buys four GRCS systems. Only one of these systems will be fully equipped. This objective GRCS system is fielded to XVIII Airborne Corps making the Contingency Force GREEN. The remaining three systems lack the direct air satellite relay and CHALS-X quality DF capabilities leaving the capability in support of III Corps, V Corps, and I Corps (Korea) AMBER.

- ARL is AMBER for all time frames. Near-term program funding will buy six multi-sensor ARL. Funding does not buy CHALS-X for ARL. There is no additional program funding to buy the final three of nine required ARLs in the mid-term or far-term.

ONE DIVISION COMMON SENSOR SYSTEM THAT DOES IT ALL

The IEW Common Sensor (IEWCS) will employ linked ground and heliborne platforms to precisely locate, electronically attack, and intercept enemy emitters. The platforms share identical components with "leap ahead" technology (TACJAM-A) to exploit sophisticated signals and provide targetable accuracy for precision strikes. The IEWCS supports division, Armored Cavalry Regiment, and separate brigade commanders' targeting and information warfare requirements. The ground platform, Ground Based Common Sensor (GBCS), will have light and heavy variants that have deployability, mobility, and ballistic protection comparable to those of the forces they support. The heliborne platform, Advanced QUICKFIX (AQF), enhances IEWCS accuracy and extends its effective range beyond 100kms in support of deep targeting.

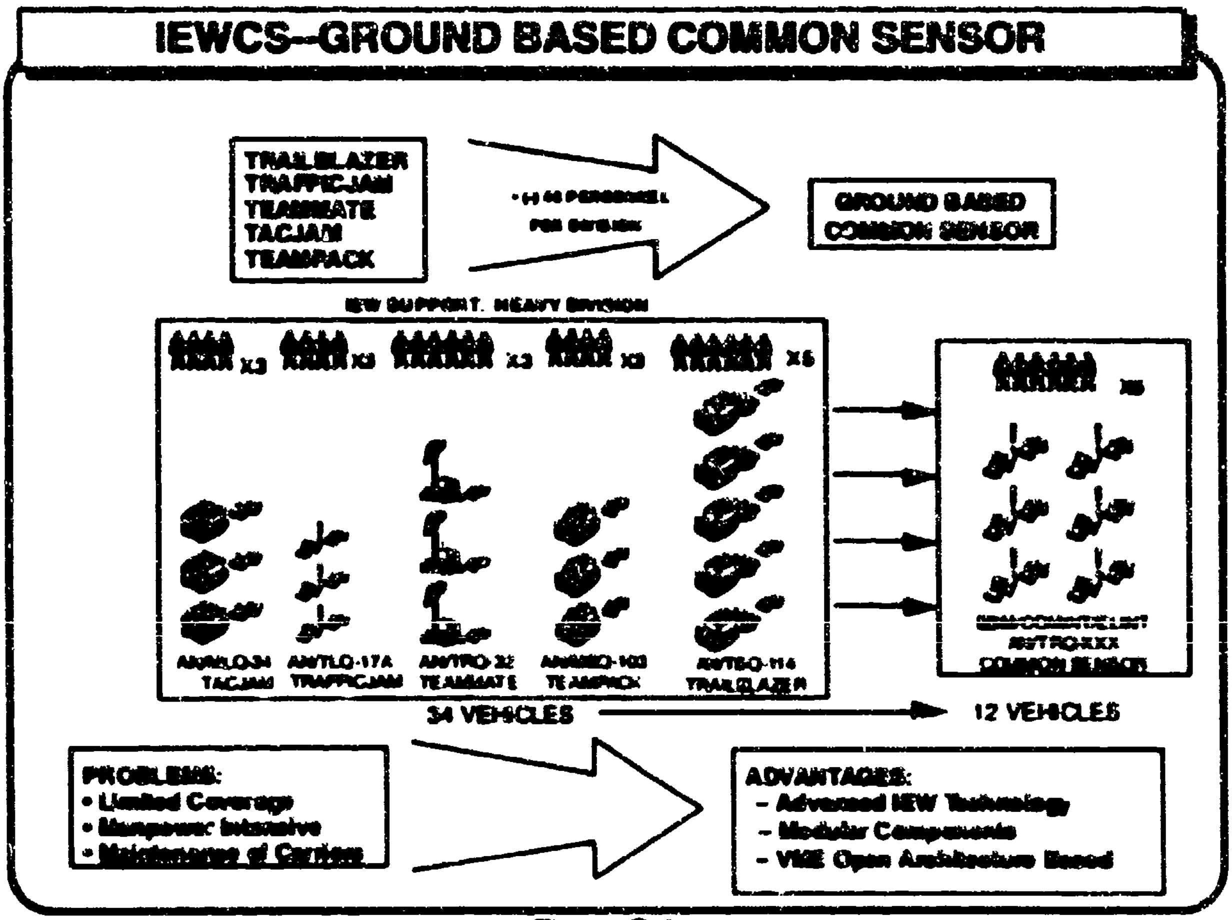


Figure G-9

Ground Based Common Sensor - Program Objective/Warfighting Impact

- We are reducing the number of vehicles by 60% and increasing capability tenfold. The Ground Based Common Sensor (GBCS) will be less expensive to maintain, require fewer soldiers to operate and, at the same time, leverage state of the art technology to provide the commander with the capability to exploit and/or deny enemy communications as well as locate and destroy his non-communications emitters.

- Interoperating with the Advanced QUICKFIX (AQF) in both heavy and light divisions, GBCS will provide organic precision weapons targeting data, SIGINT, and Electronic Attack (EA) capabilities with internal cross sensor cueing against emerging threats.

- The GBCS provides 24 hour/day all weather signals surveillance and VHF EA to the division.

- Used in conjunction with AQF, GBCS provides an extended range precision weapons targeting capability. These combined capabilities enable the identification, suppression, and/or destruction of enemy C2 and fire control systems.

- Description. The objective GBCS-L uses multimission sensor modules integrated into two HMMWV prime movers. GBCS-H would have integrated the same sensor modules into a tracked carrier, which would have provided the survivability, collection on-the-move capability, and mobility required by Mounted Forces.

- Basis of Issue. Four GBCS-L will be fielded to each light division, the separate brigade, and the ACR(L); six GBCS-H to each heavy division, and four to each heavy ACR.

AQF Program Objective/Warfighting Impact

- AQF provides organic, deep fire support targeting and SIGINT with an EA and intercept capability at division. Coupled with the GBCS, AQF provides day/night signals intelligence coverage. AQF further enhances GBCS with greater accuracy and extended ranges.

- Description. AQF is an evolution of the fielded QUICKFIX. The AQF mix of sensors includes COMINT, ELINT, EA, and precision weapons targeting with internal sensor cross cueing.

• Basis of Issue. The objective requirement is six systems per set. Programmed fielding is constrained to one set of four EH-60A aircraft, with their suite of IEW sensors, per division and ACR

Division Common Sensor Assessment

DIVISION COMMON SENSOR ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
GBCS	**RED**	**AMBER**	**AMBER**
AQF	**RED**	**AMBER**	**AMBER**

• GBCS is **RED** since no systems are fielded. Several systems that GBCS is designed to replace have already been removed from the field (TACJAM, TEAMPACK). In the near-term there is no tactical ELINT capability and a very limited jamming capability in the field. GBCS becomes **AMBER** in the mid-term with the fielding of GBCS-L to the Contingency Force. GBCS-H remains an unfunded requirement during the POM years. GBCS remains **AMBER** in the far-term because funding does not support purchase of the required quantity. There will be only four fielded per light division versus the required six and only six fielded per heavy division versus the required nine.

• AQF is **RED** in the near-term since no systems are fielded. It becomes **AMBER** force wide in the mid-term and **GREEN** for the Contingency Force with the fielding to the XVIII Airborne Corps. It remains **AMBER** in the far-term because Force Packages II and III fieldings will not be completed until 2012, and fielding is at a reduced Basis Of Issue Plan (BOIP) of four versus the required six per division.

ONE COMMON GROUND STATION TO CONDUCT THE FIGHT

The Common Ground Station (CGS) brings in intelligence broadcast through CTT, live video from the UAV, secondary imagery from national sources, and MTI and Synthetic Aperture Radar (SAR) from JSTARS to enable immediate targeting or cross-cueing of other sensors to confirm location and identification of high value/high payoff targets, as well as depicting a common picture of the battlefield from brigade to corps.

An adjunct to the Common Ground Station is development of the 3-channel Commander's Tactical Terminal (CTT). The CTT will receive broadcast intelligence information from multiple sensors, giving warfighters near real time access to early warning and targeting data. As well as being part of CGS, this component will be installed in ASAS and TENCAP systems, and will also be integrated into combat arms systems THAAD, AFATDS, ATACMS, and AVN C2.

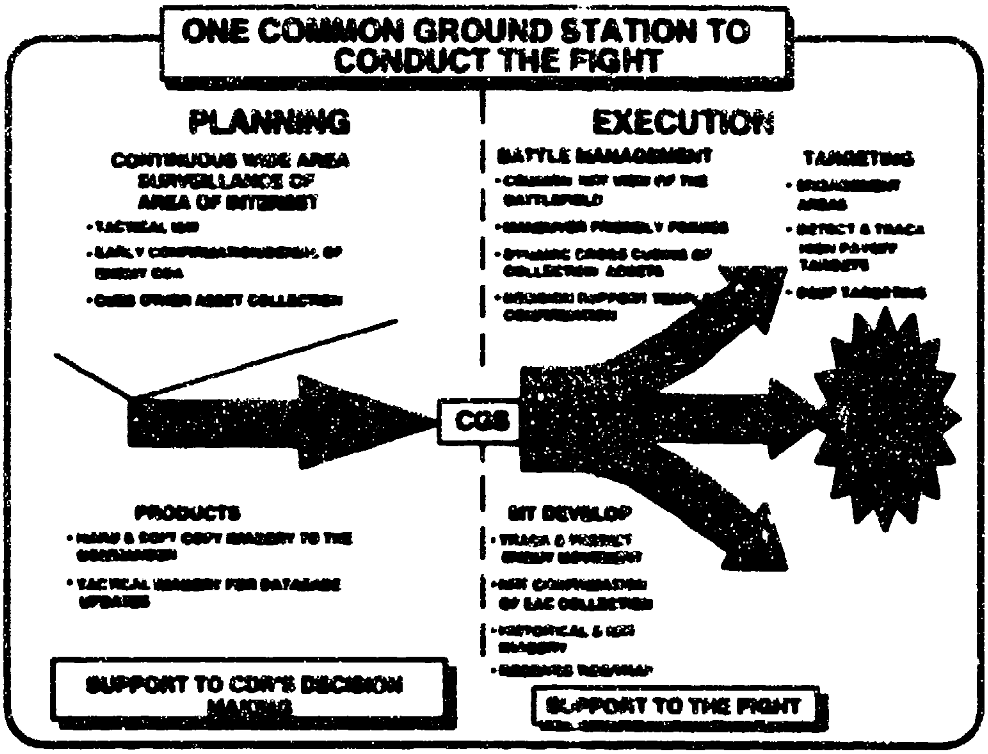


Figure G-10

CGS Program Objective/Warfighting Impact

- CGS provides commanders an almost immediate, dynamic, multi-sensor view of the battlefield for planning, targeting, and operations execution.

- CGS receives and processes MTI and SAR data from JSTARS, video from UAV, processed signals intelligence from GRCS, Rivet Joint, EP3 and U-2, and secondary imagery from TENCAP.

- Basis of Issue. CGSs are deployed at command posts, intelligence nodes, and targeting cells throughout the battlefield. Objective distribution of the CGS is two per EAC MI brigade, six per corps, six per division, one per ACR, and one per separate brigade.

One Common Ground Station Assessment

COMMON GROUND STATION ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
CGS	AMBER	AMBER	GREEN

- CGS is AMBER in the near-term and mid-term; fielding begins in the near-term time frame and is completed to the Contingency Force in the mid-term. Fielding of the Active Component within the POM provides five systems per corps and four per division. The VCSA decision on GSM fielding approved an interim 85% capability and accelerated fielding this capability to the Active Component by three to four years. Evolutionary P3I developments integrate additional technology in the far-term, raising system capability to 100%. This increase in capability and completion of fielding up to objective quantities make CGS GREEN.

ONE ALL SOURCE ANALYSIS SYSTEM (ASAS) THAT FUSES IT ALL

ASAS brings together all the pieces, fuses the data, and provides commanders the actionable intelligence needed to make reasoned decisions, in timely fashion, to affect the outcome of battle.

ASAS automated processing capabilities, including the integration of IMETS and DTSS for weather and terrain support, eliminated the intelligence bottleneck, and allowed analysts to do analysis and threat integration. Centralized collection management capabilities assure that assets and sources from all echelons are integrated and coordinated. Gaps in intelligence are quickly identified and resolved, assuring the collection effort is synchronized with the commander's intent and scheme of maneuver. Direct communications connectivity to a wide variety of national and tactical sensors assures an "all source" product and provides commanders with the intelligence to clearly view the total battlefield.

ASAS Program Objective/Warfighting Impact

- ASAS provides almost immediate fusion of all source data, direct support to situation and target development, support to target engagement, automated collection and asset management, and the intelligence interface to the Army Battle Command System (ABCS).

- Description. ASAS is designed to operate in unit command posts from EAC to battalion level. ASAS Block I combines government developed militarized equipment and software to provide an initial operating capability to Army priority units by FY 95. ASAS Extended (ASAS Block I software on NDI hardware) will provide an ASAS capability to the remainder of the Active Component by FY 96. ASAS Block II transitions to ABCS common hardware and software, provides enhanced functionality, and features an open architecture to enhance the system's capability to keep pace with technological advancements.

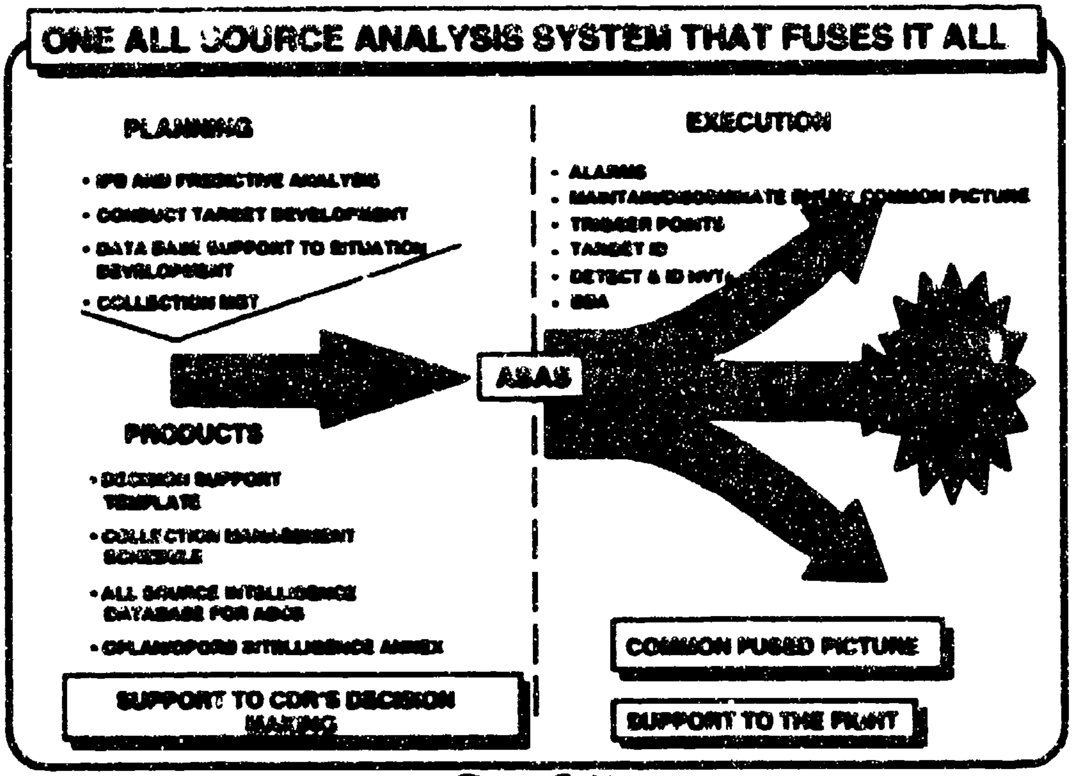


Figure G-11

• Basis of Issue. One system for each corps, division, ACR, separate brigade, and theater MI brigade.

One System That Fuses It All Assessment

ALL SOURCE ANALYSIS SYSTEM ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
ASAS	GREEN	GREEN	GREEN

• ASAS is GREEN in the near-term. Block I will be completely fielded to high priority units by FY 95, and ASAS Extended will be fielded to the remainder of the Active Component by the end of FY 96; but we have only initiated the ASAS Block II RDTE effort and the insertion of phase one prototypes into the fielded ASAS systems.

• In the mid-term and far-term ASAS is GREEN. In the mid-term we complete fielding of ASAS Extended to the Active and Reserve Components, complete phased prototype insertions into fielded ASAS, and begin Block II fielding. In the far-term ASAS completes fielding of the objective system to the total force.

- The positive reports on ASAS Block I resulted in demands from senior commanders to provide a similar capability throughout the force. This caused the Army to examine the feasibility of providing Block I software on commercial or other Non-Developmental Item (NDI) hardware, calling it ASAS Extended. In March 1994, the VCSA approved the plan to field ASAS Extended to the remainder of the active force and the 15 ARNG combat brigades.

ONE PROCESSOR TO EXPLOIT NATIONAL CAPABILITIES

Tactical Exploitation of National Capabilities (TENCAP) systems are an integrated component of the IEW architecture. They provide assured access to national and selected theater systems with the goal of providing timely support to deep targeting, battle planning, and BDA. In addition, the Army TENCAP systems provide the best source of intelligence support for all weather, day/night targeting for deep strike operations, and are critical components of the sensor to shooter linkage required to Conduct Precision Strike. Support is provided in both the IMINT and SIGINT disciplines. Through a series of preplanned product improvements, the latest technologies are continually inserted in fielded TENCAP systems and planned for the technological "leap ahead" to the next generation. Our intent is to field increasingly interoperable, deployable systems. The Army is aggressively pursuing direct linkage of national sensors to tactical systems to timeline requirements associated with targeting for deep strike operations.

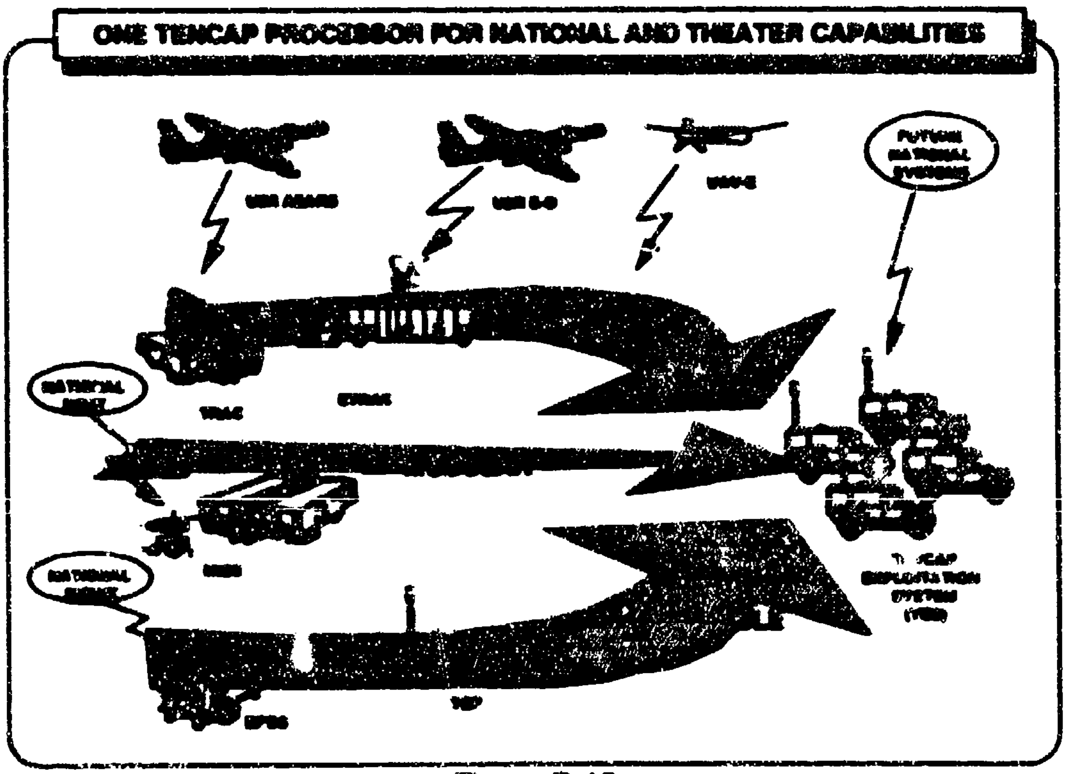


Figure G-12

• The principal TENCAP systems fielded or modernized in the mid-term are the Enhanced Tactical Radar Correlator (ETRAC) and the Modernized Imagery Exploitation System (MIES). They provide receipt, processing, exploitation, storage and dissemination of imagery intelligence from national and selected theater collectors. The Enhanced Tactical Users Terminal (ETUT) provides the capability to receive and process selected SIGINT data, to manage IMINT reports and selected imagery products, and to automate certain collection management functions via the Collection Management Support Tools (CMST) terminal. The ETUT will be retired late in the decade as the All Source Analysis System (ASAS) is fielded. The Mobile Integrated Tactical Terminal (MITT) provides a highly mobile capability to receive secondary imagery and ELINT, as well as to correlate and integrate such data. The Forward Area Support Terminal (FAST), a downsized functional equivalent of the MITT, provides those capabilities in a modular, soldier portable system. MITT and FAST are scheduled to be retired or transferred to other units as the Common Ground Station (CGS) is fielded. The Electronic Processing and Dissemination System (EPDS) receives, processes and disseminates Electronic Intelligence (ELINT). It provides an electronic picture of the battlefield based on radar activity through direct links to selected national platforms and receipt of other data through the area communications system. The EPDS is to be upgraded to an open architecture similar to the MITT, FAST and ETUT, and will be known as the Tactical Electronic Processor (TEP). ETRAC, MIES and the TEP are envisioned to be replaced by the objective TENCAP preprocessor for ASAS and CGS around the turn of the century--the TENCAP Exploitation System (TES). TES will be a scaleable, highly mobile system that can deploy early, link to theater and national platforms, and grow in processing and data exploitation capabilities as forces flow into theater.

• Basis of issue. Objective issue for ETRAC, MIES, EPDS/TEP, ETUT consists of one per selected MI brigade. Based on resource constraints, three MIES and up to three ETRACs are being procured. Eight ETUTs, six EPDS, six MITTs and 14 FASTs have been procured. An additional five MITTs are on contract and will be delivered in FY 95-96.

• The objective issue for MITT is one per division, ACR and selected corps. Units not receiving MITTs will receive FASTs.

• TES basis of issue is still under development, but can be assumed to go to units currently operating EPDS, TRAC/ETRAC and MIES. Resources will determine if a fullup TES will be fielded to those units not scheduled for MIES/ETRAC fielding.

TENCAP Assessment

TENCAP ASSESSMENT			
	Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09
TENCAP	GREEN	GREEN	GREEN

- TENCAP systems are GREEN in all time frames. In the near-term TENCAP completes fielding of MITTs. All Army theater MI brigades, corps, divisions, and ACRs have at least one item of TENCAP equipment fielded. The first ETRAC is fielded to the Contingency Force providing a major increase in capability to conduct early entry operations. TENCAP remains GREEN in the mid- and far-terms by implementing direct downlinks for the next generation of national systems and migrating older systems to TES. In the mid-term ETRAC completes fielding with projected direct national linkage to ETRAC completed and ready for implementation. TES will be fielded with continuation of direct linkage to national systems. In the far-term TES will be fielded to all corps and theaters providing direct linkages to national ELINT and IMINT systems, along with links to selected manned and unmanned theater and tactical platforms. Direct linkage from the next generation of national imagery systems is planned for implementation with the ETRAC/TES.

SUMMARY

The assessments and shortfalls of the IEW flagship systems are shown in Figure G-13.

IEW FLAGSHIP SYSTEM ASSESSMENT - WRAP UP

	SUPPORTED ECHELON					Near-term FY 95-96	Mid-term FY 97-00	Far-term FY 01-09	$ Shortfalls
	EAC	CORPS	DIV	ACR	SEP BDE				
CR-UAV			X	X	X	RED	AMBER	GREEN	
[illegible]	X	X	X	X		AMBER	AMBER	GREEN	[illegible]
[illegible]	X					RED	RED	UNK	
GRCS		X				AMBER	AMBER	AMBER	[illegible]
[illegible]	X					AMBER	AMBER	AMBER	
[illegible]			X	X	X	RED	AMBER	AMBER	[illegible]
AQF			X	X		RED	AMBER	AMBER	[illegible]
CGS	X	X	X	X	X	AMBER	AMBER	GREEN	[illegible]
[illegible]	X	X	X	X	X	GREEN	GREEN	GREEN	[illegible]
TENCAP	X	X	X	X		GREEN	GREEN	GREEN	[illegible]

Figure G-13

Priority Fixes

Four systems remain AMBER through the far-term. Other systems are at risk of changing status to AMBER through the far-term because they were decremented during finalization of the FY 96 President's Budget. Restoration of these decrements and overcoming deficiencies in two of the far-term AMBER rated systems are our priorities for funding augmentation.

PRIORITY ONE: Restoring decrements. In finalization of the FY 96 President's Budget, a total of $46 million was decremented over FY 96, FY 97, and FY 98 from ASAS, CGS, TENCAP, GBCS, AQF, TROJAN SPIRIT II, and modification of Signals Warfare systems. Those decrements occurred when OSD directed correction of specific GRCS and ARL deficiencies, partly at the expense of the overall IEW BOS. The decrements delay execution or cancel critical components of systems. Development of ASAS Block II and the direct downlink for TENCAP's ETRAC system have been slowed significantly. Fielding of ASAS, CGS, GBCS, AQF, and TROJAN SPIRIT II to selected units has been reduced, eliminated, or delayed, as have modifications to the existing signals warfare systems which bridge the gap until GBCS fielding. While these decrements helped to correct some GRCS and ARL deficiencies, they have severely impacted on the IEW BOS. Restoration of $7.6 million to ASAS, $4.0 million to CGS, $9.7 million to TENCAP, $9.0 million each to GBCS and AQF, $2.2 million to TROJAN, and $4.5 to Signals Warfare would correct these delays and fielding shortfalls.

PRIORITY TWO: SR-UAV. Procurement of Hunter (SR-UAV) has been delayed by a decrement of $131.7 million from FY 96 funds. This reduces the program's overall procurement by four Hunter systems, increases the per system cost, and delays all fieldings scheduled for FY 97 and later by 18 months. Force Package 1 fielding will not be complete until FY 01. Increasing funding from FY 97 through FY 00 by $37 million in each year would bring the fielding schedule part way to its pre-decrement schedule, completing FP 1 in FY 00, and would restore overall Hunter production to the quantity required to field the total force by FY 04.

PRIORITY THREE: GBCS. Due to budget decrements, there are no GBCS-H systems funded in the FY 96-01 POM. The major impact is that the Army loses the "collection on the move" capability, ballistic protection and tactical mobility provided only by the tracked variant. An increase of $141 million to this program would allow the purchase of 12 GBCS-H systems for fielding to two heavy divisions.

PRIORITY FOUR: GRCS. The program fields GRCS to all four corps, with varying capabilities. Only the XVIII Corps system will have the most modern CHALS-X precision location technology to support deep targeting. A funding increase of $30 million would provide the GRCS in Korea, III Corps, and V Corps, with CHALS-X modules to replace the less-accurate CHAALS components.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

IEW RDA Strategy

To accommodate the requirements of the future, IEW must use the Army's RDA concept and enabling strategies to guide its efforts. We cannot emphasize too strongly the need to continually modernize our IEW systems so the force of the future has the advantage over any adversary at any time. Advanced IEW systems must be built to achieve maximum deployability and incorporate an open systems technical architecture that accommodates growth.

Horizontal Technology Integration (HTI) plays an important role in the RDA strategy. This effort focuses on leap ahead technological advances to overmatch threats, with emphasis on rapid and early integration of interim capabilities which are then upgraded through preplanned product improvements to keep pace as technology develops. HTI also ensures that common and interchangeable components and technologies are shared by systems, and supports the overall interoperation of the intelligence system of systems. Advanced Technology Demonstrations (ATD) are used to facilitate integration of technologies.

HTI also includes open systems architectures, which accommodate evolutionary growth via technology insertion of plug in/plug out modules built to industry standards. Candidate upgrades are determined through a prototype fielding process which results in suggested high payoff technological upgrades. Off the shelf modules must be incorporated into these systems to reduce the RDA timelines and field systems quicker.

The evolution from current to future IEW systems (Figure G-14) moves IEW from single mission systems on multiple carriers to multi-mission systems on common carriers. New multifunction EW and SIGINT systems are being designed to provide greater accuracy, cover a broader frequency range, and be capable of exploiting modern modulation schemes. Work is in progress on new technology that will permit target classification based on the nature and operating characteristics of a given signal. When developed, this technology will be rapidly integrated into the IEW systems being fielded using the open systems architecture concept. Our goal is to provide the Army with the most capable IEW systems in the world, while developing future systems to meet the challenge of the 21st Century.

As discussed earlier, part of that challenge is operating on the joint battlefield. Some major Army IEW programs are being developed jointly with the Marines, such as GBCS and the Marine EW Support System (MEWSS). The MEWSS is identical to the GBCS except for the carrier. The PRD-12, an Army developed, manportable, COMINT intercept system, is being used by both the Army and Marines. ASAS functionality is being integrated into the Navy Joint Maritime Combat Information System (JMCIS)--a

Navy ASAS. The Ground Station Module and Commanders Tactical Terminal are also being developed in close cooperation with the Marines. In fact, the Marines have expressed an interest in buying some components of each system to ensure a common battlefield picture among the ground components.

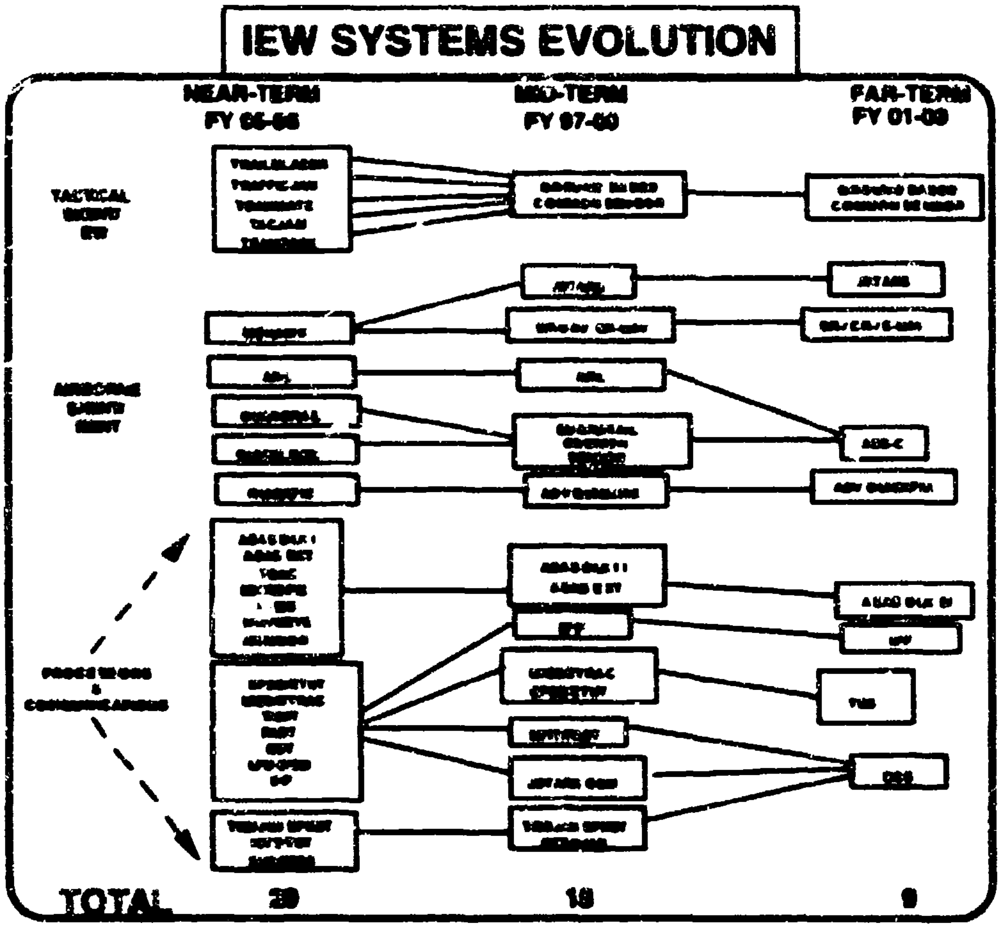


Figure G-14

MODERNIZATION OBJECTIVES

The IEW RDA Strategy supports accomplishment of Army Modernization Objectives. IEW systems are developed and acquired to enable the intelligence system of systems to fulfill its role in the objectives of Win the Information War, Conduct Precision Strike and Protect the Force.

Win The Information War

A major thrust of future RDA efforts will be in the area of information warfare. Winning the Information War is one of the keys to decisive victory and is essential to success. To win we must destroy, disrupt, and exploit an adversary's information system, while ensuring that our commanders receive accurate intelligence in time to

use it. The warfighter needs to know where friendly forces are located, and where the enemy is and is not, in addition to real time information on the progress of the battle to maintain the initiative and win decisively. IEW will employ a wide range of systems to disrupt, deny, and damage threat information systems.

Conduct Precision Strike

A second focus of the IEW RDA effort will be to support the conduct of precision strike. A power projection army will frequently be called upon to fight numerically outnumbered, and relies heavily on technological superiority to overcome its enemies. The ability to accurately identify, locate, and attack critical targets, and then rapidly shift attention to other targets is essential.

In conducting precision strike, IEW systems play a key role in target development, target acquisition, and post strike damage assessment. The fused intelligence information in ASAS will support development and prioritization of target sets. The IEW RDA strategy develops and acquires precision location systems such as CHALS-X and "see over the next hill" capabilities like UAV to locate targets with sufficient accuracy for immediate engagement by indirect fires. Broadcast intelligence systems and processors now in development will provide the near real time links from these sensors to shooters. Information collected by UAV and national systems and routed through the same processors will provide battle damage assessment in near real time, confirming successful attack or supporting follow-up strikes.

Protecting the Force

RDA efforts will also focus on protecting friendly forces. Surveillance of wide areas and focused reconnaissance will provide combat information to prevent surprise and allow friendly forces to be maneuvered to meet all threats. Electronic warfare capabilities are also being developed to protect personnel and critical equipment. Two significant contributors to force protection in the RDA program are CR-UAV and SHORTSTOP.

CR-UAV protects the force by providing brigade commanders with an ability to see "over the next hill" to prevent surprise and identify threats from enemy maneuver forces. It can monitor open flanks, perform reconnaissance of potential avenues of approach, and also support rear area security.

SHORTSTOP also plays a key role in Protecting the Force. This electronic warfare system will cause premature detonation of proximity fused munitions, diverting their destructive power away from personnel, high value equipment, and critical battlefield nodes. SHORTSTOP remains passive until it detects signals from incoming RPF munitions, and then transmits signals to deceive them into early detonation. Currently being developed, SHORTSTOP will be fielded beginning in FY 99 with a basis of issue of two per squad in Light, Airborne, and Air Assault forces and Mounted Forces.

Summary

The Army needs better communications, target identification, fusion centers and a shorter decision cycle than its adversaries. To Win the Information War, Conduct Precision Strike, and Protect the Force the intelligence community requires the capabilities listed in Figure G-15. IEW modernization must meet future requirements and operate within the framework for planning and executing information operations shown in Figure G-16. IEW's challenge is to modernize its force to support the Army's Force Projection cycle through all phases of the operation.

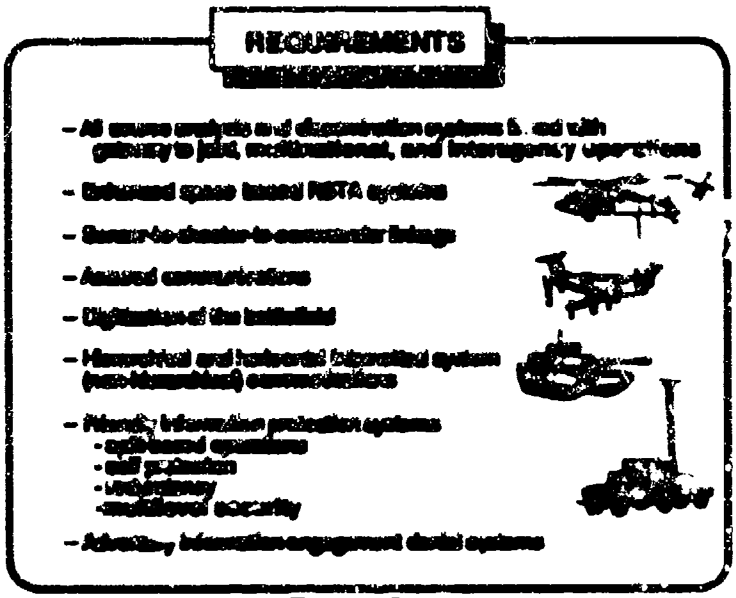


Figure G-15

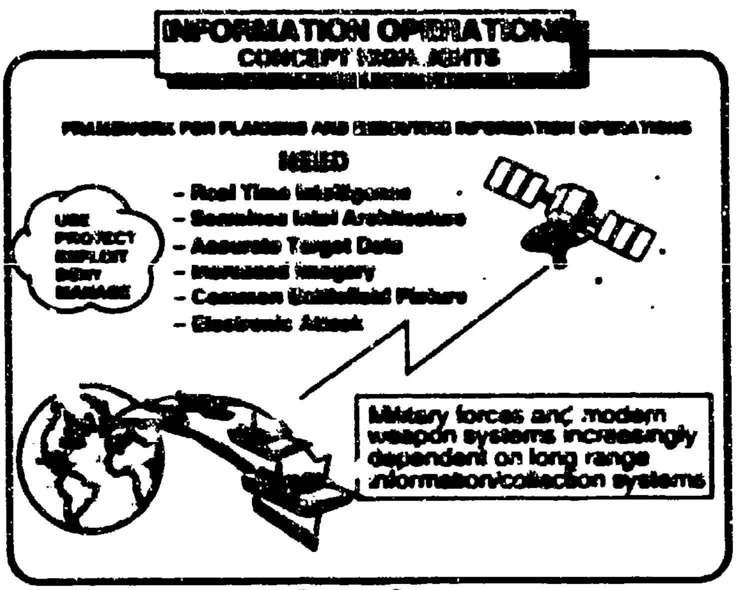


Figure G-16

SECTION 5

TRAINING

Our current training system focuses on separate intelligence disciplines and relies heavily on institutional training. The training strategy of the future focuses on an integrated, system of systems approach to training that reduces reliance on institutional training and places more emphasis on unit and displaced training, the exploitation of simulators and training devices, and the enhanced use of computer based training and other emerging training technologies. This training strategy is applicable to all levels of operating systems. Figure G-17 provides a view of this training strategy.

IEW TRAINING STRATEGY

NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
INTELLIGENCE DISCIPLINES TRAIN SEPARATELY	MULTIDISCIPLINE TRAINING FOR COLLECTION / ANALYSIS CAPABILITY	MULTIDISCIPLINE TRAINING FOR COLLECTION / ANALYSIS CAPABILITY
COMPUTER OPERATOR LITERACY	FULLY COMPUTER LITERATE OPERATIONS	STATE OF THE ART COMPUTER TRAINING
DEDICATED MAINTENANCE TRAINING	OPERATOR/SYSTEM MAINTENANCE TRAINING	MAXIMUM USE OF OPERATOR LEVEL MAINTENANCE TRAINING
INSTITUTIONAL TRAINING	UNIT SUSTAINMENT TRAINING BASED ON EXTENSION TRAINING	UNIT SUSTAINMENT TRAINING IN SIMULATED COMBAT ENVIRONMENT
	LIMITED USE OF ARTIFICIAL INTELLIGENCE (AI) IN FTX/CPX	ENHANCED USE OF AI IN FTX/CPX
	PARTIALLY AUTOMATED SIMULATION SUPPORT TO FTX/CPX	FULLY AUTOMATED SIMULATION SUPPORT TO FTX/CPX
	LIMITED USE OF EMBEDDED TRAINING	MAXIMUM USE OF EMBEDDED TRAINING

Figure G-17

Language Training

Language training remains a critical requirement for many IEW soldiers. Basic and advanced language training is provided by the Department of Defense Foreign Language Program (DFLP). Language proficiency is an essential skill for SIGINT voice intercept operators, a limited number of SIGINT analysts, all HUMINT operators, and for some counterintelligence agents.

The retention of skilled linguists is a serious challenge when compared to other fields. Foreign language skills are highly perishable if they are not constantly honed through job experience or individual study. The extensive time and dollar investment in linguists must, therefore, be protected through careful career management, the use of monetary incentives (such as enlistment/reenlistment bonuses and linguist incentive pay), and the provision of sustainment and specialized training packages for use in the field.

IEW Training Devices, Simulators, and Simulations

The training strategy and development plan incorporates IEW training devices, simulators, and simulations such as the Military Intelligence Language Trainer (MILT), an automated language training database. Additionally, the evolutionary development of the TROJAN system has potential for integrated training and readiness for collection, collection management, analysis, reporting, production, and dissemination. The elements of this strategy are given in Figure G-18.

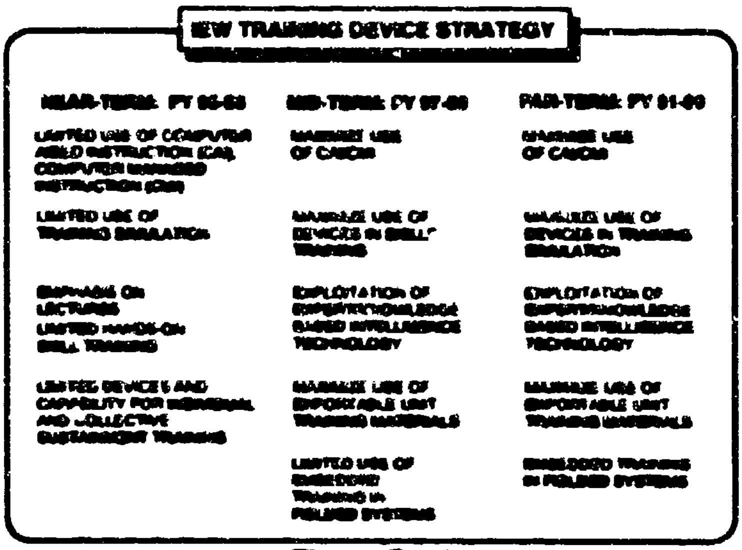


Figure G-18

The expanded use of simulation in training has many positive implications. Intelligence capabilities will be replicated in support of FTX/CPXs like the Battle Command Training Program (BCTP) at Fort Leavenworth and the National Training Centers. BCTP order of battle and threat functionality are being made ASAS compatible so that ASAS can serve as a simulator work station. Realistic simulation ensures intelligence systems are full participants in Louisiana Maneuvers, Joint Precision Strike Demonstrations and the Battle Labs. From these actions, the Army leadership will understand the capabilities of IEW systems and how to employ them on the battlefield.

SECTION 6

CONCLUSION

IEW is modernizing the full spectrum of Army doctrine, organization, training, and equipment to field the Army Intelligence capability of tomorrow. Intelligence XXI will support Force XXI and will be rapidly tailorable and deployable. It will support all military operations, from peace operations through major regional conflict, and will be effective in joint and multinational operational environments. The Army Intelligence program will provide the warfighting commanders at each echelon of command--from battalion to theater--a common, timely, complete, and accurate picture of the battle space.

The Army of the 1990s and beyond is, and will be, significantly different from the Army of the Cold War. As we reshape to a power projection army, the imperative to maintain a viable modernization program becomes ever more important. This modernization plan produces the force required for the future. It addresses IEW shortfalls and produces a balanced, versatile, and deployable force. Supported by realistic and comprehensive training programs, IEW modernization will provide the warfighting commander the intelligence and information to win the next fight.

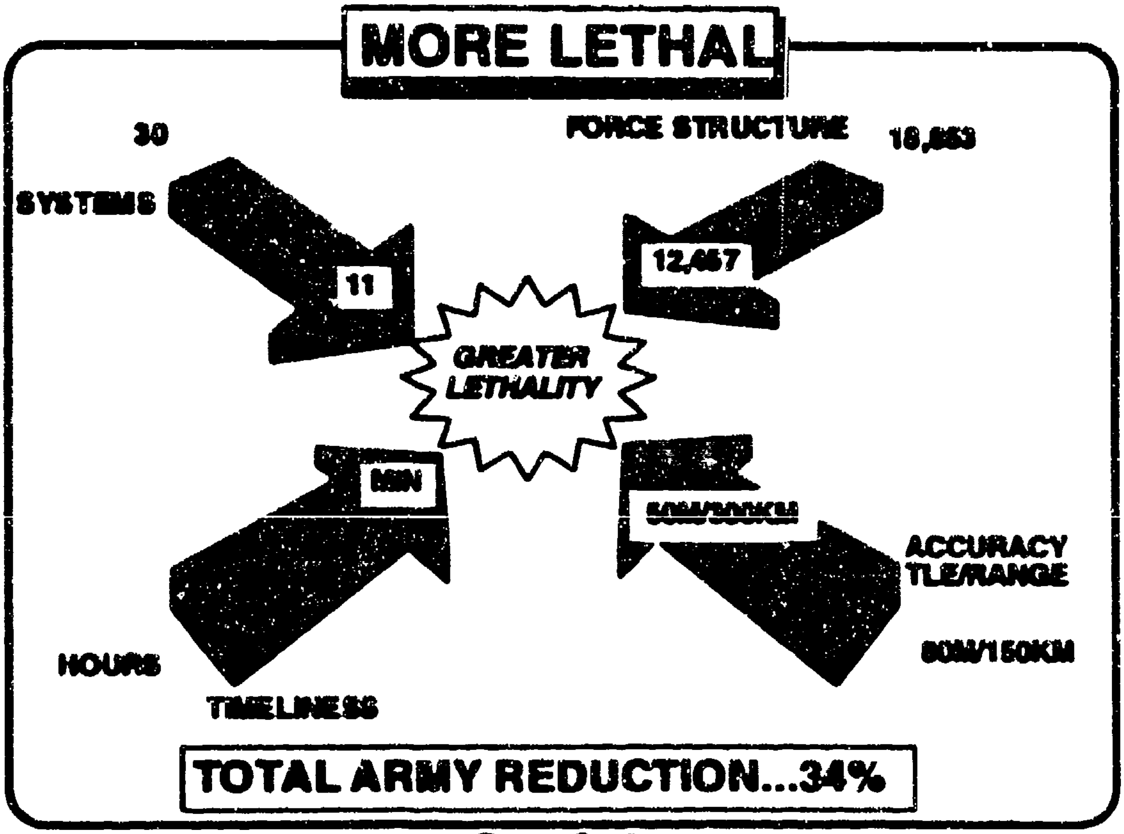
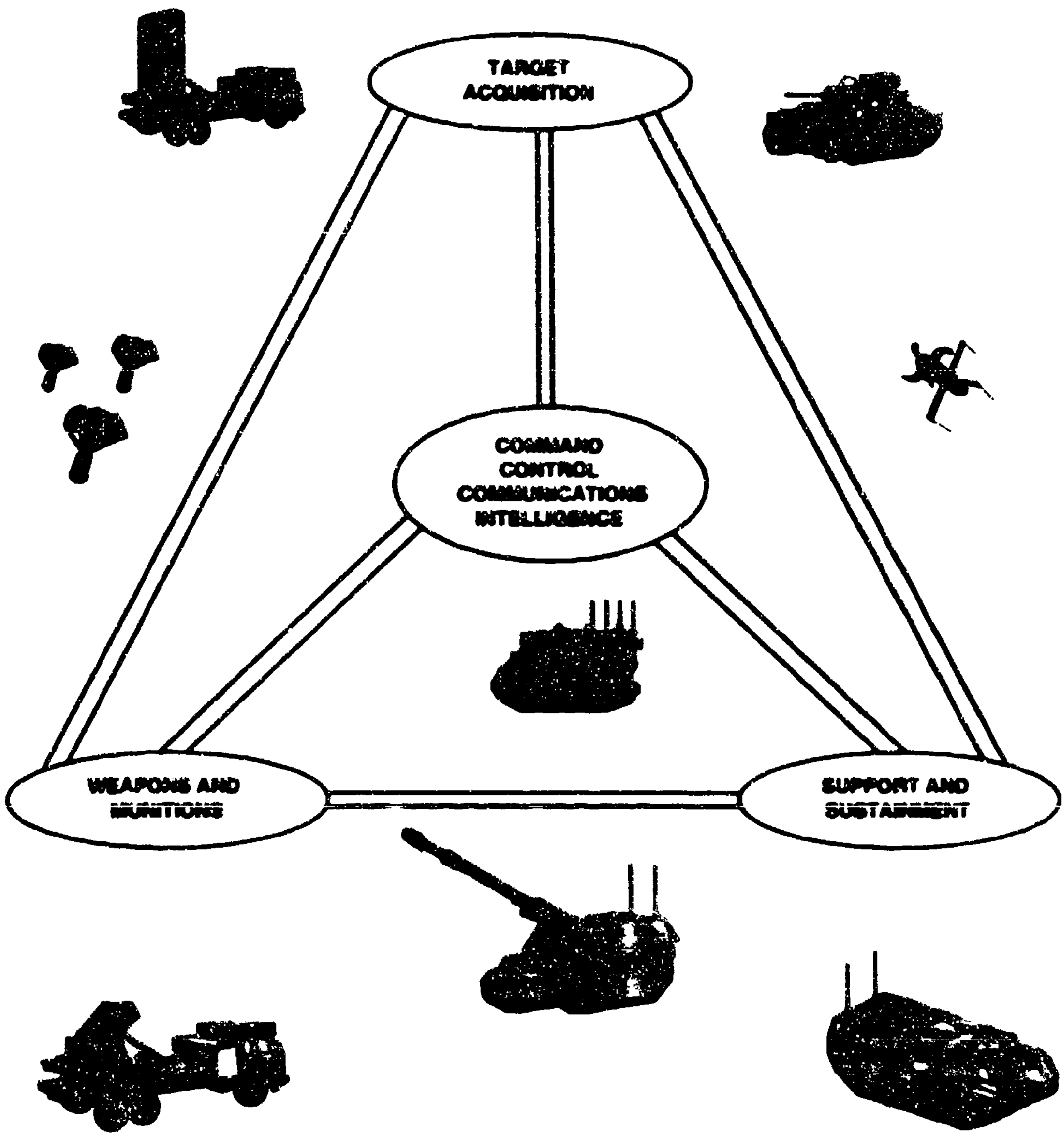


Figure G-19

ANNEX H

FIRE SUPPORT



ANNEX H

FIRE SUPPORT

SECTION 1

INTRODUCTION

The capability to engage and destroy enemy forces with accurate, long-range indirect fires gives commanders great advantage on the battlefield. Maintaining such an advantage is required for true Land Force Dominance and it, in turn, requires greater reliance on high technology weapon systems and information age command and control systems. The Program Objective Memorandum (POM) for Fiscal Years 1996-2001 funds revolutionary technology which can be employed by soldiers to meet the joint force commander's objectives.

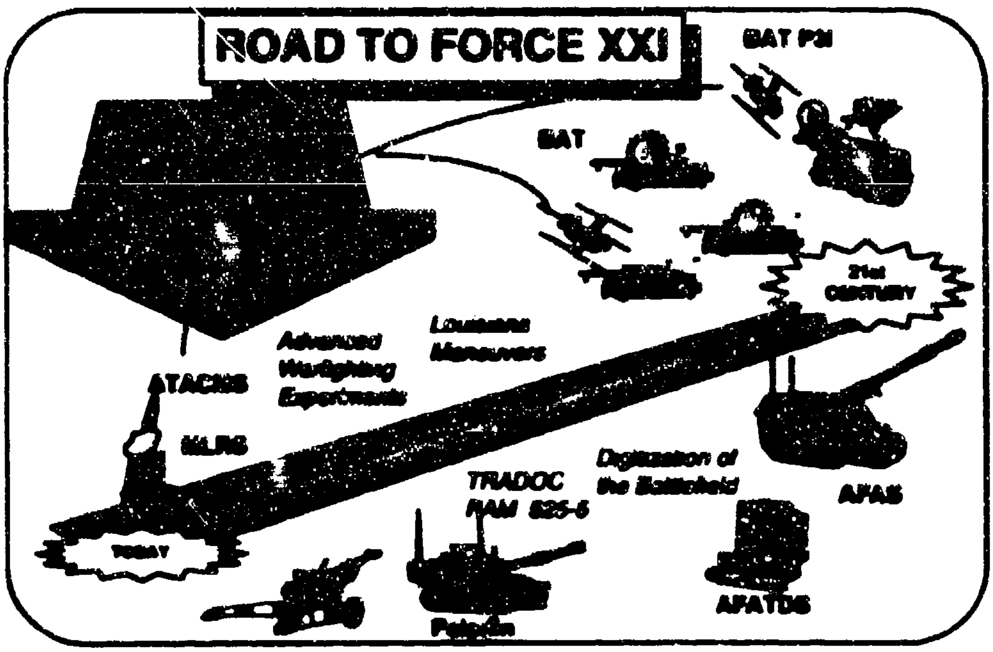


Figure H-1

As the Army sets out to define Force XXI, the trends which will shape the future of the Field Artillery are apparent. Force XXI artillery will be characterized by sophisticated weapon systems sharing common databases which are fully interoperable across all of the battlefield operating systems. Combining all elements of combat power into a seamless structure will allow instantaneous application of combat power. Common combat information available at all echelons, without time consuming coordination processes, will allow leaders to focus on intuitive tactical judgment rather than managing machines and manual processes.

While Force XXI artillery is taking shape in the Field Artillery School's "Vision 2020," many of the technological trends pushing us toward the future are reflected in this modernization plan. Today, during user testing, the Advanced Field Artillery Tactical Data System (AFATDS) can communicate with the intelligence battlefield operating system through the All Source Analysis System (ASAS). This combination allows automated linking of sensors to shooters based on the commander's guidance. The result means timely destruction of key enemy capabilities in all weather, day/night operations.

Weapon systems are already moving toward a combination of lethal long-range munitions and the decentralized information power to bring them to bear when and where the commander wants. Today, the Paladin Howitzer and the Multiple Launch Rocket System (MLRS) maneuver across the battlefield, quickly deliver devastating fires, and survive. MLRS launches Army Tactical Missile System (ATACMS) Block I missiles which provide precision strike interdiction and support Theater Missile Defense attack operations. Tomorrow, each 155mm Sense and Destroy Armor (SADARM) round will yield a four-fold increase in effectiveness over our previous munitions. In the future, the revolutionary "shoot and scoot" tactics of M109A6 Paladin will be matched by a revolution in hardware--Advanced Field Artillery System/Future Armored Resupply Vehicle (AFAS/FARV).

The trend toward precision destruction of moving and stationary targets at long-range is already taking form in the brilliant anti-armor submunition--BAT and BAT P3I--programs. Combined with the rapidly deployable and operationally mobile High Mobility Artillery Rocket System (HIMARS), planned for development and fielding in the next decade, future joint force commanders will have a rapidly available capable system for deep warfighting.

SECTION 2

WARFIGHTING CONCEPT

INTRODUCTION

In order to understand the contribution of various modernization systems, it is necessary to review the way we apply indirect fires in support of the battle. This section explains the three major roles of field artillery forces and identifies the units available today to carry out those roles.

FIELD ARTILLERY ROLES

Close Support. Close support is the engagement of enemy forces that threaten the close fight. Close support field artillery Command and Control (C2), cannon, and rocket systems provide maneuver forces with the capability to employ decisive fires simultaneously throughout the battle space. Close support field artillery elements integrate warfighting systems into the scheme of maneuver by planning and coordinating all indirect fire support, target acquisition, firing data computation and delivery of fires from all organic and supporting weapons. They synchronize key elements of the combined arms team including tactical air, army aviation, naval fire support, electronic warfare and mortars. This creates synergism; direct fire systems bringing overwhelming force to bear on the enemy's decision-making cycle, disrupting his operations. The delivery of close cannon and rocket fires extends the fight throughout the battle space, allowing commanders to set the conditions for, and control the tempo of, decisive tactical operations. This responsive, all weather, day/night, all terrain, massed fires capability engages more targets and kills more enemy forces earlier, producing more favorable force ratios at the front lines.

Advances in fire support technology will increase the tempo, lethality, and depth of warfare for Force XXI. Technologically advanced close fire support will multiply the maneuver force's capability to shock, overpower, and destroy enemy forces. The close combat force will be capable of securing objectives faster; thus, fire support enhances the survivability and sustainability of forces. Close fire support systems are a force multiplier that enable close combat commanders to fight simultaneously with decisive fires throughout his battle area.

Counterfire. Counterfire is the total effort to defeat enemy indirect fire assets. The enemy's cannon, rocket, and long-range missiles must be attacked to protect our forces. Planning for the counterfire battle begins with the intelligence preparation of the battlefield. Terrain and enemy capabilities are compared to the maneuver commander's objectives and available target acquisition assets. The counterfire battle can be divided into proactive and reactive phases. The proactive phase uses all available targeting intelligence to locate enemy firing units and command and control nodes. As targets are identified, they can be engaged by the most appropriate attack assets before the enemy can employ them against us. The reactive phase typically

involves Firefinder radar detection of those cannons and rockets which fire at our forces. Since the decide, detect, deliver methodology is used, sensors, such as Firefinder, are linked to available shooters. The Force XXI counterfire battle is characterized by instantaneous intelligence links from a myriad of available sensor platforms. The result is destruction of the enemy's indirect fire weapons (including theater missiles), allowing freedom of action for our forces.

Interdiction. Interdiction is defined as fires that destroy, disrupt, or delay threat forces at depth. Interdiction fires take advantage of information technology to fight the battle at greater depths, at greater tempos, and with greater lethality. Interdiction fires can be highly responsive since they are not constrained by the cycles of targeting, deciding, and scheduling based on static reserved areas of responsibility on the battlefield. Using the decide, detect, deliver methodology, and sensor to shooter architecture coupled with long-range artillery systems, the Force XXI Land Component Commander (LCC) has the capability to deliver deep fires and fight enemy formations simultaneously throughout the depth of the battlefield. Using combat-proven sophisticated sensors (such as Joint Surveillance Target Attack Radar System (JSTARS)) to locate designated high payoff targets, downlinked through Ground Station Modules (GSM) to MLRS units with ATACMS, the LCC has the capability to extend the battlefield in time and space and set the conditions for decisive close combat. Because the land component commander has the flexibility to accurately engage his high payoff targets in three to five minutes with a responsive, all weather, day/night system at ranges in excess of 100 km, he can attrit enemy forces and shape the battlefield, thereby protecting his forces and winning decisively.

As artillery systems such as ATACMS evolve, Force XXI will have the capability to efficiently engage armored formations on-the-move or stationary as well as enemy C3 nodes, sensors and weapons of mass destruction at extended ranges in excess of 250 km. The capability to deliver fires at these ranges, coupled with advances in friendly sensors, will give commanders the flexibility to deliver accurate deep fires across the corps front. More than ever, deep fires will enable the Force XXI LCC to Dominate the Maneuver Battle, Win the Information War, and decisively defeat his enemy with minimum casualties.

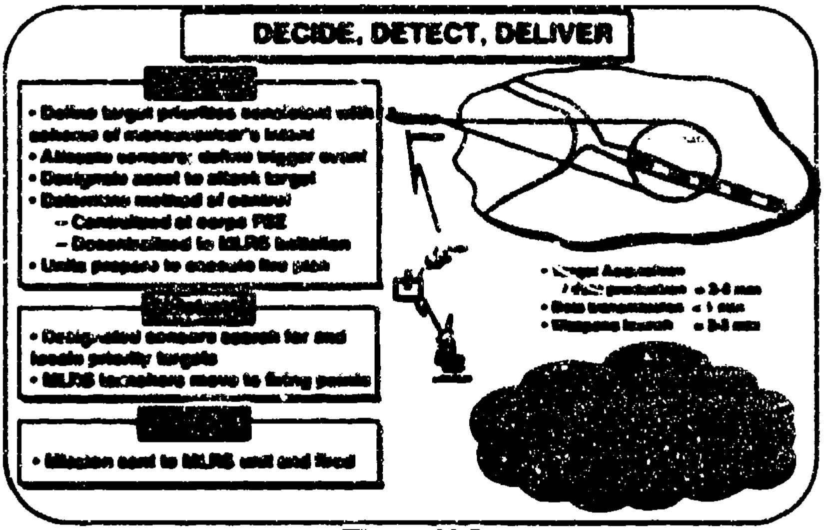


Figure H-2

FIELD ARTILLERY FORCES

Field Artillery units support all maneuver commanders at all levels. Direct support field artillery battalions, with reinforcing battalions from corps or division, are responsible for *close support*, while general support units from corps or division are the primary executors of the *counterfire* battle. MLRS units perform *interdiction*, firing rockets at divisional level, and rockets and ATACMS missiles at the corps level.

Light Forces

Light infantry, airborne, and air assault divisions and separate light infantry brigades are supported by direct support artillery battalions with 18 M119A1 105mm towed Howitzers. The M119A1 fires to a range of 14.3 km (unassisted) or 19.5 km (assisted). Its rate of fire is 10 rounds per minute (maximum) or three rounds per minute (sustained). The M119A1 is towed by the heavy HMMWV and is UH-60 transportable.

Each direct support battalion also has a single AN/TPQ-36 Firefinder radar section to detect enemy mortars and artillery to a range of 12 km and rockets to 24 km. The automated command and control/fire direction system is the Initial Fire Support Automation System (IFSAS).

Both active and National Guard light infantry divisions have general support batteries with M198 155mm towed Howitzers. The M198 weighs 15,750 pounds, is towed by a 5-ton truck and fires a variety of munitions to 24 km (unassisted) or 30 km (assisted). Its rate of fire is four rounds per minute (maximum) or two rounds per minute (sustained).

The light ACR has three organic Howitzer batteries with M198 Howitzers.

Mounted Forces

Armor and mechanized infantry divisions and separate brigades have direct support battalions with 24 M109-series 155mm self-propelled Howitzers. The basic M109A2/3 fires a variety of munitions to a range of 18.1 km (unassisted) or 23.5 (assisted). Its rate of fire is four rounds per minute (maximum) or one round per minute (sustained). The M548A1 or the M992A1/A2 serves as the ammunition carrier. Direct support battalions provide the maneuver commander with fire support teams for locating and engaging targets with indirect fire weapon systems. The fire support teams are equipped with the M981 Fire Support Team Vehicle (FIST-V).

Mounted divisions also have a general support Multiple Launch Rocket System (MLRS) battery of nine M270 rocket launchers. The M270 fires up to 12 rockets to a range of 32 km or two Army Tactical Missile System (ATACMS) missiles at targets in excess of 100 km.

Division target acquisition support is provided by a target acquisition battery with three AN/TPQ-36 and two AN/TPQ-37 Firefinder radars. The AN/TPQ-37 locates enemy mortars and artillery to a range of 30 km and rockets to 50 km. Additional target acquisition and reconnaissance support are provided by the observation aircraft (OH-58C/D) of the Target Acquisition and Reconnaissance Platoon (TARP). These aircraft are assigned to the division's General Support Aviation Battalion, but perform combat missions under the operational control of the division artillery commander.

A heavy ACR has three organic Howitzer batteries with eight M109 series Howitzers.

The automated command and control/fire direction system in the division artillery and the ACR is the Initial Fire Support Automation System (IFSAS).

Corps Artillery

The corps commander can influence the battle by providing additional artillery to the division commanders so they can weight/reinforce the main effort by massing fires at critical targets in the close battle, or attack the enemy throughout his formations with deep fires in general support to the corps.

Corps artillery is organized into field artillery brigades comprised of MLRS battalions (27 launchers each) and M109-series 155mm battalions (24 Howitzers each). Corps with light divisions also have brigades with M198 155 towed battalions (24 Howitzers each) and target acquisition detachments with two AN/TPQ-37 Firefinder radars. Target Acquisition and Reconnaissance Companies (TARC) provide helicopters for reconnaissance and target acquisition in support of the corps artillery commander.

SECTION 3

CURRENT PROGRAM ASSESSMENT

INTRODUCTION

The ability of currently fielded systems to meet the warfighting needs of the Field Artillery is reassessed constantly. This section addresses the capability of our fire support system of systems to accomplish its major roles during near- (FY 95 - 96), mid- (FY 97 - 00) and far-terms (FY 01 - 09). Each of the Field Artillery roles--close support, counterfire and interdiction--is assessed over these timeframes using these rating categories:

RED--No capability exists, or is insufficient to defeat the threat or provide the required support.

AMBER--A limited capability or quantity exists to perform the mission; and

GREEN--Adequate capability and quantity exists to perform the mission.

ASSESSMENT AND MODERNIZATION SOLUTION

Here, the deficiencies within each major role are identified and the desired modernization solution is described. In the assessment figures, each materiel solution is listed across from the deficiency it helps to correct and below the timeframe during which it is planned for fielding. Systems which could correct deficiencies but are unfunded are listed in the timeframe they could be available if funded. These unfunded requirements are marked with an asterisk. A description of the listed modernization systems is provided in Section 4, Research, Development and Acquisition Strategy.

Close Support

- Current situation. The deficiencies that currently exist in close support are best illustrated by the M109A2/A3 Howitzer. This venerable system was developed in the 1950s and first fielded in the 60s. While it has gone through a number of upgrades culminating in the M109A6 Paladin now being fielded, it is outranged by much of the world's artillery and cannot keep up with the Abrams and Bradley forces that it must support. The current fire support vehicle (M981 FIST-V) continually fails to meet Army operational readiness standards and is less mobile than its supported forces. The M198 towed 155mm Howitzer supporting our most mobile light forces has severe tactical and strategic mobility problems. The current command and control system is too slow and does not fully incorporate fire support doctrine.

Near-term Assessment: AMBER

In the near-term, we will complete fielding the M119A1 towed Howitzer to the active component light forces and field the M109A6 Paladin. For the heavy force not programmed to receive the Paladin, the M109A5 155mm self-propelled Howitzer is being developed. It has automotive and armament improvements to increase reliability and range, and a collective NBC system to improve survivability. The Initial Fire Support Automation System (IFSAS) will displace the hard-to-support TACFIRE, fielding some of the equipment which will be used for AFATDS. The AN/TMQ-41 Meteorological Measuring Set and its supporting AN/TMQ-42 Meteorological Hydrogen Generator will improve the acquisition of timely meteorological data.

Mid-term Assessment: AMBER

Mid-term improvements are keyed to continued fielding of the Paladin and the M109A5. AFATDS is fielded in growing quantities to replace the aging TACFIRE C2 system. Improvements to target acquisition include a Bradley Fire Support Team Vehicle (BFIST) with enhanced mobility equal to the supported force and enhanced horizontal communications with Force XXI maneuver forces. The 155mm SADARM will add improved munitions lethality. All forces need the Lightweight Laser Designator Range finder (LLDR) to provide man-portable and vehicle mounted precision munition designation, but it is unfunded. Computer Assisted Artillery Meteorology System (CAAMS) will provide improved meteorological data to cannon and rocket systems.

CLOSE SUPPORT

DEFICIENCY	MODERNIZATION SOLUTIONS		
	NEAR-TERM (FY 9[illegible] - 9[illegible])	MID-TERM (FY 97 - [illegible])	FAR-TERM (FY 01 - [illegible])
RATING	AMBER	AMBER	AMBER
OUTRANGED	M109A6 HOW M109A6 PALADIN	M109A6 HOW M109A6 PALADIN	AFAS/FARV ADVANCED TOWED CANNON ARTILLERY SYSTEM (ATCAS)* HIGH CAPACITY PROJECTILE (HICAP)* XM982*
MUNITION LETHALITY		155 MM SENSE AND DESTROY ARMOR (155 SADARM) 105 DPICM	155 SADARM XM982* HICAP* MSTAR*
SLOW RATE OF FIRE	M109A6 PALADIN	M109A6 PALADIN	AFAS/FARV
SUSTAINABILITY	M109A6 HOW M109A6 PALADIN FAARV	M109A6 HOW M109A6 PALADIN BRADLEY FIRE SUPPORT TEAM VEHICLE (BFIST) IFCS/ALMS	AFAS/FARV BFIST IFCS/ALMS ATCAS*
SURVIVABILITY	M109A6 HOW M109A6 PALADIN FAASV	M109A6 HOW M109A6 PALADIN BFIST IFCS/ALMS	AFAS/FARV BFIST IFCS/ALMS ATCAS*
MANPOWER INTENSIVE		GUN LAYING AND POSITIONING SYSTEM (GLPS)	AFAS/FARV GLPS ATCAS*
STRATEGIC DEPLOYABILITY		SENSE AND DESTROY ARMOR (SADARM)	HIMARS ATCAS* MSTAR*
TACTICAL MOBILITY		LIGHT FORWARD ENTRY DEVICE (LFED)* BFIST	AFAS/FARV BFIST ATCAS*
ACCURACY EQUIPMENT	METEOROLOGICAL MEASURING SYSTEM (MMS) MET HYDROGEN GENERATOR (MHG) MUZZLE VELOCITY SYSTEM (MVS)	MMS MVS MHG COMPUTER ASSISTED ARTILLERY MET (CAAMS*)	MVS TARGET AREA MET SENSOR SYSTEM (TAMSS)*
TARGET ACQUISITION		BFIST LLDR* LFED* UAV-CR	BFIST
INADEQUATE FIRE SUPPORT AUTOMATION	INITIAL FIRE SUPPORT AUTOMATION SYSTEM (IFSAS)	ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM (AFATDS)	AFATDS

* UNFUNDED IN CURRENT POM/EPA

Figure H-3

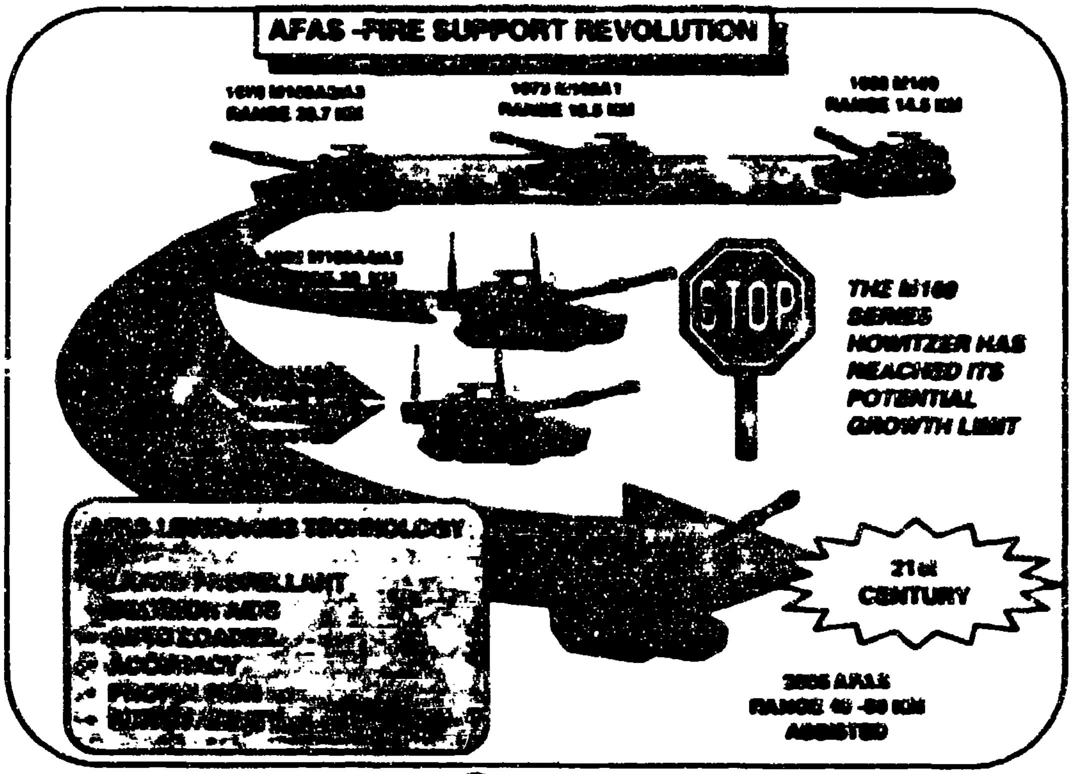


Figure H-4

Far-term Assessment: AMBER

The primary far-term improvement in close support is the replacement of the Paladin in heavy forces by the Crusader, formerly called the Advanced Field Artillery System (AFAS) and the Future Armored Resupply Vehicle (FARV). Paladin will be fielded to lower priority units, allowing some older M109s to be retired. However, the combined procurement quantities of Crusader and Paladin are not enough to displace all older M109s; in addition, some light forces will still retain Vietnam-era M102 105 towed howitzers and the M198 155 towed howitzer will still be in force because the Advanced Towed Cannon Artillery System (ATCAS) (formerly called the Lightweight 155 Howitzer) is unfunded. The assessment remains AMBER because of insufficient quantities of modernized howitzers for the force. To complement new weapons, improved, more lethal, longer range projectiles are being designed (XM982, formerly Extended Range Artillery Projectile (ERA) and Hi-capacity ammunition (HICAP)). Target Area Meteorology Sensor System (TAMSS) will continue to upgrade meteorological collection techniques with the addition of meteorological profilers and UAV delivered meteorological sensors.

Counterfire

- Current situation. The current counterfire system has outdated, hard to maintain Firefinder radars now outranged by threat cannon and rocket systems. Current munitions require large expenditures of ammunition to achieve the required levels of damage. The MLRS has outdated, high maintenance mechanical and fire control systems. MLRS with basic rockets is outranged. Smart submunitions and guidance or improved accuracy are needed. HIMARS is critical for light forces deployability and early entry capabilities. There is no imaging targeting system organic to corps to locate and identify high payoff counterfire targets.

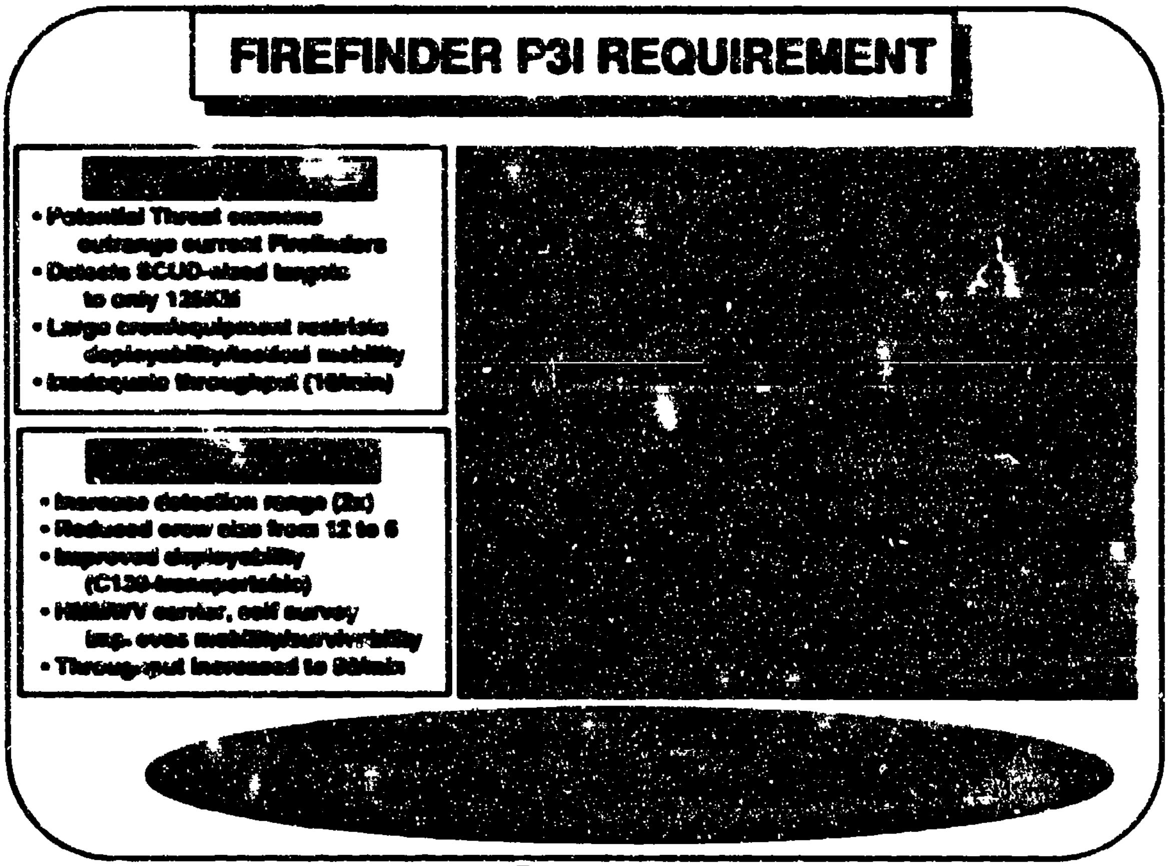


Figure H-5

COUNTERFIRE

DEFICIENCY	MODERNIZATION SOLUTIONS		
	NEAR-TERM (FY 95 - 96)	MID-TERM (FY 97 - 00)	FAR-TERM (FY 01 - 08)
RATING	AMBER	AMBER	GREEN
TARGET ACQUISITION CAPABILITY	Q-36 VERSION 8 Q-37 BLKI UNMANNED AERIAL VEHICLE - SHORT RANGE (UAV-SR)	Q-36 V8 Q-37 BLKI UAV-CLOSE RANGE (UAV-CR)	FIREFINDER P3I
INADEQUATE RANGE	MLRS M109A5 PALADIN	EXTENDED RANGE MLRS ROCKETS (ER MLRS)	AFAS XM982* HICAP* ER MLRS HIGH MOBILITY ARTILLERY ROCKET SYSTEM (HIMARS)
LETHAL MUNITIONS		155 SENSE AND DESTROY ARMOR (SADARM) 105 DPICM	155 SADARM XM982* MLRS SMART TACTICAL ROCKET (MSTAR)*
ACCURACY EQUIPMENT	METEOROLOGICAL MEASURING SYSTEM (MMS) MET HYDROGEN GENERATOR (MHG) MUZZLE VELOCITY SYSTEM (MVS)	MMS MVS MHG COMPUTER ASSISTED ARTILLERY MET (CAAMS*)	MVS TARGET AREA MET SENSOR SYSTEM (TAMSS)*
FIRE CONTROL TECHNOLOGY / RESPONSIVENESS		MLRS IMPROVED FIRE CONTROL SYSTEM (MLRS IFCS) MLRS IMPROVED LAUNCHER MECHANICAL SYSTEM (MLRS ILMS)	MLRS IFCS MLRS ILMS
* UNFUNDED IN CURRENT POM/EPA			

Figure H-6

Near-term Assessment: AMBER

Near-term improvements center on product improvements to the Q-36 counter-mortar radar system. The inability to continue funding MLRS launchers will leave the Reserve Components with a serious counterfire deficiency. Short-range UAV provides a leap ahead in target acquisition capability. The AN/TMQ-41, Meteorological

Measuring System will be fielded to about one half the units required due to funding constraints. The Muzzle Velocity System (MVS) will begin fielding; this system replaces the obsolete M90 Chronograph and allows accurate measurement of cannon projectile velocity.

Mid-term Assessment: AMBER

Mid-term improvements increase lethality with the introduction of SADARM for the 155mm cannon. It provides a quantum leap in counterfire efficiency and effectiveness (Figure H-7). The Extended Range MLRS Rocket (ER MLRS) will provide extended range (45 km) and improved accuracy for improved effectiveness against threat long-range artillery systems. The MLRS Improved Fire Control System (IFCS) will provide a state of the art fire control system with reduced maintenance and growth potential for future munitions. The Improved Launcher Mechanical System (ILMS) will increase survivability and responsiveness providing continued improvements in sensor to shooter timelines. Q-37 Block I Firefinder is an upgrade to the existing AN/TPQ-37 which improves mobility, transportability, target detection range and maintainability. Additionally, the planned introduction of UAV-Close Range improves accuracy and depth of target acquisition.

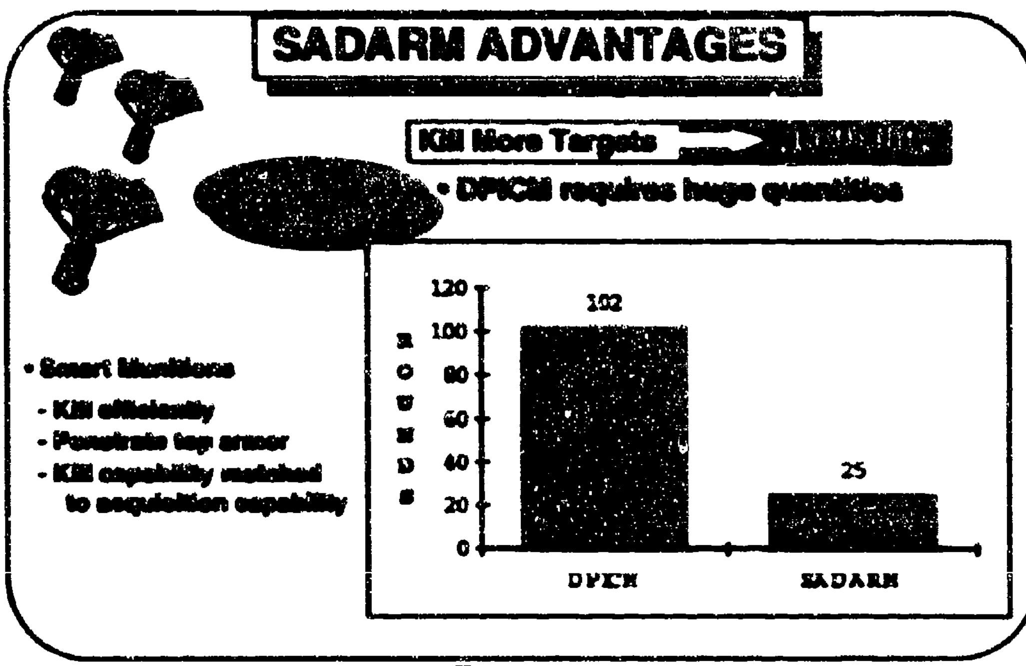


Figure H-7

Far-term Assessment: GREEN

In the far-term, the fielding of the Q-37 Firefinder P3I will increase our counter battery radar range to match that of available long-range cannon and rocket systems. Firefinder P3I's goal of 60 km range against cannons will offset threat cannons that can

attack the radar and friendly troops without being detected. The initial fielding of AFAS, and the fielding of extended range rockets, will give field artillery the "reach" to protect the force at even greater range. MLRS Smart Tactical Rocket (MSTAR), currently unfunded, is needed to provide precision-guided submunitions delivered to the range of the MLRS extended range rocket. HIMARS will provide light forces with a quantum leap in firepower.

Interdiction Fires

• Current situation. During Operation Desert Storm the highly successful use of ATACMS demonstrated the Army's ability to execute interdiction fire at depth. Current munitions, however, are limited to unguided bomblets and do not achieve the range required to support the joint force commander with responsive effective fires. There is no effective capability to engage moving targets. There is no anti-emitter munition available which can seek and destroy high value enemy targets by detecting radio or radar emissions. The current command and control system does not provide seamless links and common distributed databases to maximize potential effectiveness.

INTERDICTION FIRES

DEFICIENCY	MODERNIZATION SOLUTIONS		
	NEAR-TERM (FY [illegible])	MID-TERM (FY 97- [illegible])	FAR-TERM (FY 01 - [illegible])
RATING	AMBER	AMBER	GREEN
RANGE	ARMY TACTICAL MISSILE SYSTEM BLOCK I (ATACMS BLKI)	ATACMS BLKIA	ATACMS BLKIA ATACMS BLKIIA
MOVING, HARD TGT KILL			ATACMS BLKII
MOVING AND STATIONARY, HARD AND SOFT TARGET KILL			ATACMS BLKIIA
TARGET ACQUISITION	JSTARS UAV-SR	JSTARS UAV-SR	FIREFINDER P3I
ANTI-EMITTER CAPABILITY			
FIRE CONTROL		MLRS IFCS	MLRS IFCS
STRATEGIC DEPLOYABILITY			HIMARS
RESPONSIVENESS		MLRS IFCS MLRS ILMS AFATDS	MLRS IFCS MLRS ILMS AFATDS

Figure H-8

Near-term Assessment: AMBER

Near-term solutions include the continued procurement of ATACMS, JSTARS, Ground Station Module, and Guardrail Common Sensor (GRCS). This, in conjunction with the projected procurement of the Unmanned Aerial Vehicle-Short Range (UAV-SR), enhances our capability to conduct accurate, responsive interdiction fire.

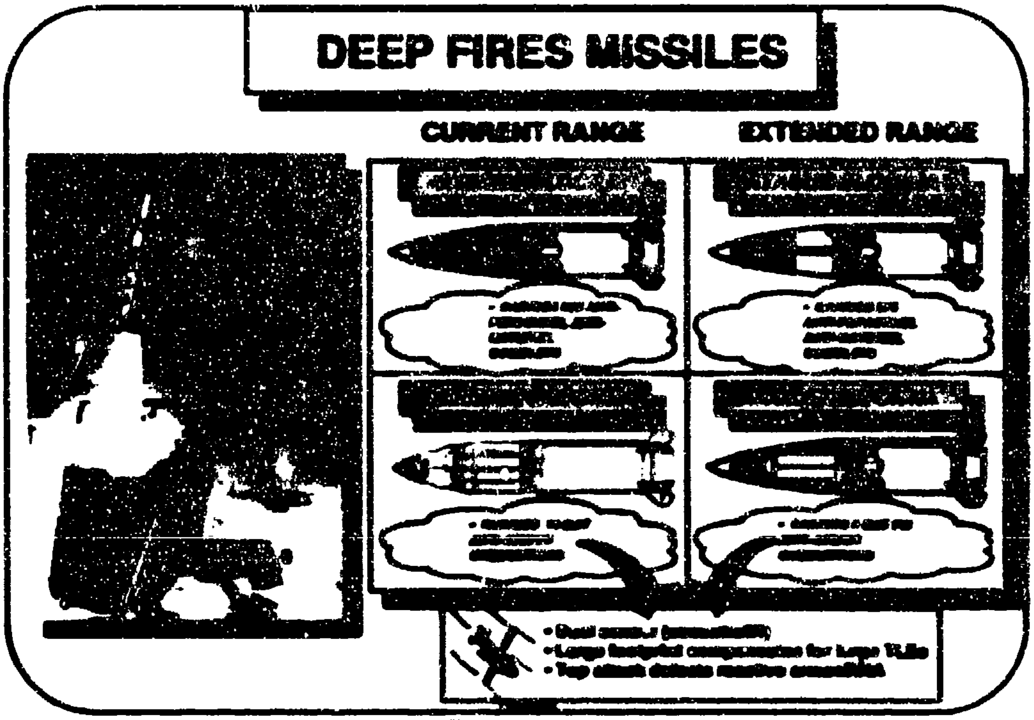


Figure H-9

Mid-term Assessment: AMBER

In the mid-term, ATACMS Block IA is produced to attack interdiction targets at twice the depth of the currently fielded Block I. ER MLRS becomes available to increase the capability of the MLRS system. Combined with continued acquisition of responsive sensors, and fielding of AFATDS, the Army's deep strike capability becomes more robust.

Far-term Assessment: GREEN

In the far-term, our fire support modernization strategy produces a lethal deep strike force. Fielding of ATACMS Block II with BAT, and ATACMS Block IIA with BAT P3I, will be well underway. Additional funding is needed, however, for munitions to attack emitters and further increase our capabilities. Acquisition of the HIMARS will ensure early deploying forces are protected by deep strikes. When procured, the RAH-66 Comanche will provide unprecedented sensor and information processing capability for deep fires target acquisition. Comanche can work deep, in excess of 200

km, acquiring targets for ATACMS or other deep strike systems, or can engage targets with Hellfire missiles, rockets, or 30mm cannon. For more details about the Comanche, see Annex O, Aviation.

SUMMARY

SUMMARY OF RATINGS

ROLE	RATING		
	NEAR-TERM (FY 95 - 96)	MID-TERM (FY 97- 00)	FAR-TERM (FY 01 - 10)
CLOSE SUPPORT	AMBER	AMBER	AMBER
COUNTERFIRE	AMBER	AMBER	GREEN
INTERDICTION FIRES	AMBER	AMBER	GREEN

Figure H-10

While today's fire support systems are impressive, the requirement to keep pace in a changing world requires that we modernize continually. Our modernization plan provides for investment in those areas which will give the greatest return in combat capability.

SECTION 4

RESEARCH, DEVELOPMENT AND ACQUISITION STRATEGY

FIRE SUPPORT PROGRAMS

The development and improvement programs outlined here meet future fire support needs and attain our goal of "a trained and ready Army that can execute the National Military Strategy."

SCIENCE AND TECHNOLOGY (S&T)

In order to maintain technological leadership, promising technologies are continuously evaluated for application to warfighting. After a technology has matured, it can participate in an Advanced Concept Technology Demonstration (ACTD); here its contribution to mission accomplishment is evaluated. Several ACTDs and other science and technology (S&T) programs have potential application to fire support.

Rapid Force Projection Initiative (RFPI) - RFPI explores the integration of new tactics, training, procedures, and technologies for air deployable, early entry forces to provide the means to defeat a heavy threat. Emphasis is on a system of systems approach using forward deployed sensors to provide rapid targeting for lightweight, stand-off weapons. Precision guidance is also emphasized to increase lethality, survivability, and to reduce logistics burdens. A new Advanced Concept Technology Demonstration, featuring a large-scale force-on-force exercise and leave-behind equipment after the demonstration, has been approved by OSD. Acoustic sensors play a key role in both RFPI and the new ACTD.

Notable technology demonstrations, under the RFPI, that support this mission area are:

Advanced Sensor Submunition Technology (ASST) Technology Demonstrations - This demonstration evaluates real time performance of state of the art laser radar and sensor hardware for automatic acquisition and engagement of mobile high value targets in realistic battlefield environments, various clutter, weather, and countermeasure conditions. This program provides technology for possible improvements to SADARM, allowing effective engagement of moving targets.

Extended Range Artillery (ERA) Projectile Technology Demonstration - This TD demonstrates a 155mm projectile concept which addresses conventional artillery needs for increased range. The round will deliver DPICM cargo to extended ranges (40 - 50 km) by using a hybrid rocket design and currently fielded cannon. The design incorporates highly refined base-burn and rocket technologies with a new streamlined configuration and cargo-carrying projectile.

155mm Lightweight Automated Howitzer (LAH) Technology Demonstration- This demonstrates a 155mm Howitzer that weighs 9,000 pounds or less and provides performance comparable to the current M198 towed Howitzer, which weighs 15,750 pounds. The technology demonstration examines crew size and responsiveness. Smart fire control, including GPS, digital communication, auto gun laying, etc., will significantly enhance system efficiency. Composites, loader assist and electro-rheological fluid recoil are also under consideration. The Howitzer will fire all 155mm ammun. n and provide a highly mobile, day/night all weather fire support capability.

Multi-Platform Launcher (MPL) Technology Demonstration - This TD demonstrates a lightweight fire support rocket system to provide light forces with more accurate missiles with sufficient range and firepower to engage in a complete spectrum of ground targets. Emphasis is on strap-on, low cost guidance technology for the ER MLRS rocket. Further, by using wheeled vehicles rather than tracked launchers this would greatly reduce the strategic lift required for the early entry forces.

Joint Precision Strike Demonstration (JPSD) - JPSD improves and demonstrates the Army's precision strike capability to hunt and kill high value, short dwell targets and assess damage within tactically meaningful timelines. JPSD leverages advanced technologies, new concepts, and architectures through a structured series of demonstrations supported by distributed interactive simulation. JPSD establishes the Army Precision Strike Technical Integration and Evaluation Center at the Topographic Engineering Center, Fort Belvoir, Virginia. The Center is the vehicle for conducting and supporting live and simulated precision strike demonstrations which facilitate the synergistic integration, virtual prototyping, and evaluation of precision strike technologies, operational concepts, and architectures.

The notable technology demonstrations, under the JPSD initiative, that support this mission area are:

Surface to Surface Technology Demonstration - This demonstration evaluates advanced target acquisition capabilities for the employment of Army deep attack assets against a high priority target set. Recent demonstrations highlighted the use of the long-range, surface to surface Army Tactical Missile (ATACMS) Block IA System in a precision strike scenario as well as depicting the integration of the ATACMS BLK IA with various sensor systems to acquire and destroy high value, time critical threat systems at extended range.

Precision/Rapid Counter Multiple Rocket Launcher (MRL) Advanced Concept Technology Demonstration (ACTD) - This ACTD demonstrates a significantly enhanced capability for US Forces Korea (USFK) to destroy deployed North Korean heavy MRLs. The overall objective is to respond within the enemy's timelines and to control the tempo of operations. The ACTD focuses on the demonstration of more efficient sensor to shooter processes to reduce timelines against this fleeting time-critical target. The demonstrations will be live or via virtual prototype simulations.

Additionally, there are a number of significant S&T programs:

Meteorological Improvement Program (MIP) - The requirement for accurate meteorological information increases as the range of cannon or rocket systems increases. Both AFAS and extended range rockets for the MLRS require improvements to our current meteorological system. The ability to generate meteorological messages at one-half hour intervals will allow maximum delivery accuracy. MIP has two main thrusts: the Target Area Meteorological Sensor System (TAMSS) and Computer Assisted Artillery Meteorological System (CAAMS). TAMSS combines atmospheric profilers and satellite receiver equipment to supplement or possibly replace balloon soundings. CAAMS uses a computer algorithm to update a meteorological message for a particular position and correct for the time elapsed since the balloon was flown.

GPS Guidance Round - This program is developing a number of concepts for the use of global positioning system in artillery projectiles. The first phase is to miniaturize GPS technology into a 155mm fuze. The system receives GPS signals during flight allowing a comparison of "should hit" versus "did hit" data. Further developments include a miniature inertial measurement unit with a drag flare to allow for improved accuracy and a system to allow for range and deflection correction.

Battlefield Imaging Projectile System (BIPS, formerly Video Imaging Projectile System) - BIPS is a fire-and-forget projectile that provides video imaging of the battlefield, allowing real time battle damage assessment, target detection, recognition, and classification.

Acoustic sensors - These sensors offer great potential for detecting, tracking, classifying, and identifying targets at relatively long-range. The RFPI program will use an acoustic sensor to provide early warning and targeting data for stand-off killers.

21st Century Land Warrior (CLW) - Technologies under development have multi-system applicability and address lethality, survivability, affordability, crew-machine interface (e.g., workload, fightability, situational awareness), strategic deployability, and tactical mobility. Particularly relevant to the fire support mission area is the automated, accurate target handoff capability 21 CLW provides. 21 CLW combines thermal imager, laser range finder, digital compass, integrated GPS and soldier computer, and links the soldier into the digital C2 net.

Bistatic Radar for Weapons Location (BRWL) Advanced Technology Demonstration (ATD) - This ATD uses bistatic and other advanced radar techniques and technologies to demonstrate potential solutions for the Firefinder P3I requirement. The BRWL demonstration system has superior detection range than the current AN/TPQ-37 with reduced false locations and location throughput greater than 100 per minute. It will provide improved classification of counterfire targets and will simultaneously perform friendly and hostile fire missions as well as detection, classification, and tracking of theater ballistic missiles.

UPGRADES

Many fielded systems can have their service life extended by upgrading existing capabilities. While some of these programs remain unfunded, several are moving toward fielding:

UPGRADES

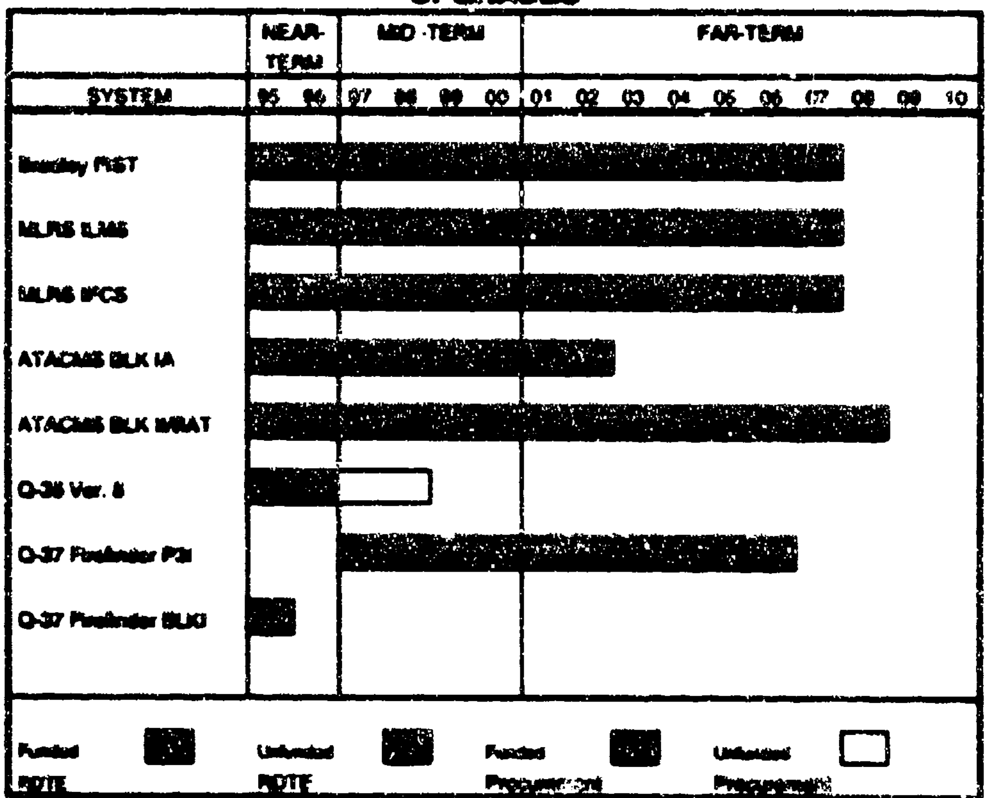


Figure H-11

- **Bradley Fire Support Team Vehicle (BFIST)** - The BFIST is a Bradley converted to a FS configuration. It replaces the M981 FIST-V and provides the mobility required to keep pace with our Bradley/Abrams-mounted forces. It incorporates a navigation and direction system; an integrated sight system that provides day/night all weather visibility, range finding and designation; and, an improved automatic target handoff system. BFIST maximizes effectiveness of digital communications among maneuver and fire support elements. ***First Unit Equipped (FUE): 4QFY 96***

- **M981 Fire Support Team Vehicle (FIST-V)** - Although being replaced by BFIST in part of the force, the M981 remains with approximately 65% of the Total Army. Modifications to improve both capability and readiness potentially include a low profile turret, a 275HP power train, and an inertial/GPS navigation and direction finding system. The goal is to keep the Fire Support Team mission

equipment on the M981 compatible with that on the BFIST. *FUE: Powertrain FY 96*

- **MLRS Improved Launcher Mechanical System (ILMS)** - ILMS replaces key components in the M270 launcher in order to provide a quantum jump in responsiveness and enhance launcher survivability. The ILMS saves more than one minute for both ATACMS and rocket missions. *FUE: 3QFY 00*

- **MLRS Improved Fire Control System (IFCS)** - The IFCS provides a complete modernization of the onboard navigation and fire control functions by replacing key components with modern improved systems. The IFCS launcher includes a low-level wind sensor to improve accuracy with extended range rockets. IFCS will incorporate the BIT/BITE self-diagnostics capability allowing the system to better define electronic and mechanical failures. The result is a reduction in operating costs while improving effectiveness. *FUE: 3QFY 00*

- **ATACMS Block IA (BLK IA)** - (Formerly ATACMS P3I, formerly ATACMS ER). ATACMS BLK IA, now fully funded, is a modification of the current basic missile. The payload has been reduced to approximately 275 bomblets, allowing the missile to fly over twice its present range. Global Positioning System (GPS) capability improves missile accuracy. Future improvements include integration of BAT P3I. *FUE: 2QFY 98*

- **ATACMS Block II** - The ATACMS BLKII carries 13 Brilliant Anti-armor Submunitions (BAT). The BAT engages moving armored formations using combined acoustic and infrared sensors. The acoustic sensors allow an extremely large search area, thus facilitating targeting. The BAT P3I will be incorporated into ATACMS BLKII after it is developed. *FUE: 3QFY 01*

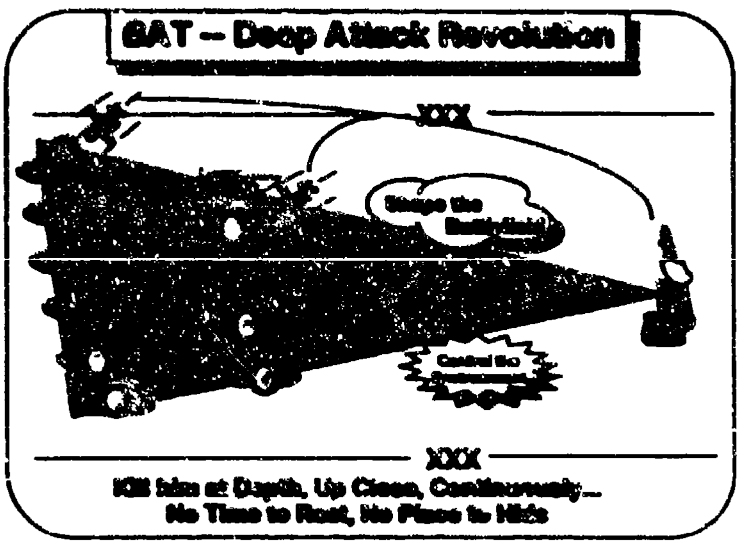


Figure H-12

- **ATACMS Block IIA** - The ATACMS BLKIIA carries six BAT Preplanned Product Improvement (BAT P3I) to approximately twice the range of the BLKII. The BAT P3I engages moving and stationary soft and hard targets using combined acoustic, millimeter wave and infrared sensors. The acoustic sensors allow an extremely large search area, thus facilitating targeting. ***FUE: FY 03***

- **AN/TPQ-36 Version 8 Upgrade** - The Q-36 Version 8 provides a major electronics upgrade to our mortar locating radars (Q-36 Version 5 and Version 7). Version 5 is the system currently fielded in most active and all reserve component units. The Version 7 fielded in FY 93 - FY 94 downsizes the radar to a HMMWV-only configuration and adds the Modular Azimuth and Positioning System (MAPS). The Version 8 increases the range by 50% and increases target throughput from four to 20 targets per minute. This improvement prevents electronics obsolescence by updating Firefinder processing technology from the 70s to the 90s. In addition to the performance improvements, the computer signal processor specifications allow growth to the AN/TPQ-37, Firefinder P3I. ***FUE: 2QFY 96***

- **AN/TPQ-37, Firefinder Block I** - Q-37 BLKI provides several upgrades: loading on C-130/C-141 aircraft without special loading equipment, greater mobility through the modified track suspension system, longer target detection range, incorporation of a self-survey capability, reduced false alarms, and improved maintenance from cooler and dehydrator upgrades. ***FUE: 1QFY 95***

- **AN/TPQ-37, Firefinder P3I** - The primary requirement for Firefinder P3I is improved range. The goal is to locate mortars and artillery to 60 km and Tactical Ballistic Missiles (TBM) to 300 km.. The increase in range against cannons is necessary to keep pace with the proliferation of long-range artillery. Additionally, the radar will prioritize and classify targets by type (mortar, artillery, rocket, etc.). Firefinder P3I will be a major contributor to theater missile defense attack operations. Targets located by the radar can be attacked by ATACMS with APAM or BAT P3I warheads. Studies to examine the feasibility of using Firefinder as an early warning/cueing sensor for active defense systems such as PATRIOT, THAAD, or Corps SAM are underway. ***FUE: FY 02***

DEMONSTRATIONS AND VALIDATIONS

DEM/VALs are designed to reduce risk prior to EMD.

- **Advanced Field Artillery System (AFAS)/Future Armored Resupply Vehicle (FARV)** - AFAS and FARV remain fully funded and currently have subsystems in technology demonstration. They will enter DEM/VAL in FY 95. AFAS/FARV provide leap ahead technology for fire support. The introduction of automatic ammunition handling and loading provides a quantum leap in rate of fire to offset the improved quality and quantity of threat artillery. AFAS and

FARV, the centerpiece of fire support modernization, will reduce manpower requirements and exploit technology to improve rate of fire, range, reliability, accuracy, responsiveness, and survivability. The AFAS liquid propellant cannon will achieve a maximum range of 40-50 km with a rate of fire of 10-12 rounds per minute allowing one Howitzer to provide a 4-8 round simultaneous impact capability. AFAS/FARV is a technology carrier for future armored vehicles. Technologies with horizontal integration potential include: decision aids, survivability enhancements and advanced integrated propulsion system. The combined crew of six represents a 1/3 reduction in manpower over the current M109 system. ***FUE: FY 05***

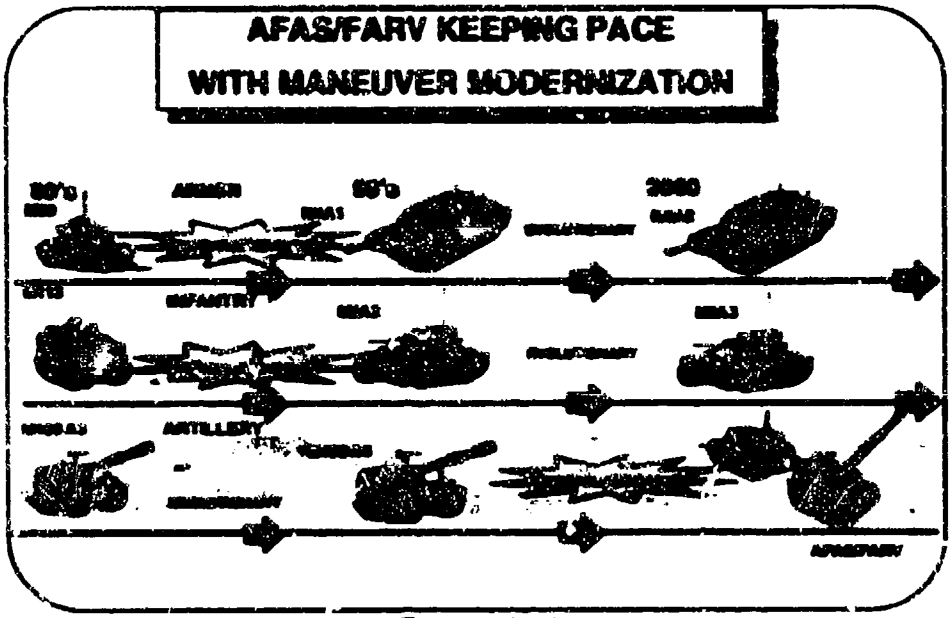


Figure H-13

DEMONSTRATIONS AND VALIDATIONS

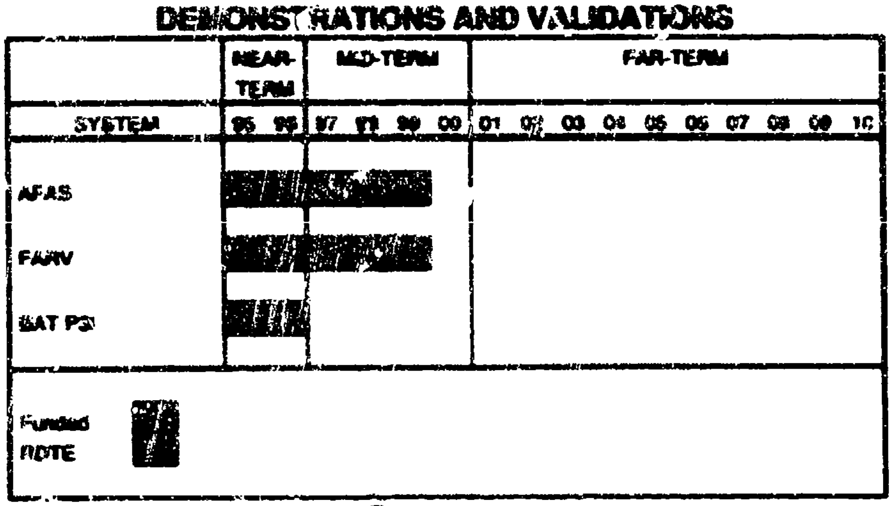


Figure H-14

• **Brilliant Anti-armor Submunition Preplanned Product Improvement (BAT P3I)** - BAT P3I increases the effectiveness of basic BAT. It incorporates improved seeker technology and software and warhead enhancements to attack additional targets, add robustness against countermeasures and improve its capabilities during degraded weather. Funded to be carried in ATACMS Block IIA, it adds versatility and flexibility to the deep fires program. ***FUE: FY 03***

ENGINEERING AND MANUFACTURING DEVELOPMENT (EMD)

These systems are planned for entry into EMD during the POM/EPA period.

ENGINEERING AND MANUFACTURING DEVELOPMENT EMD

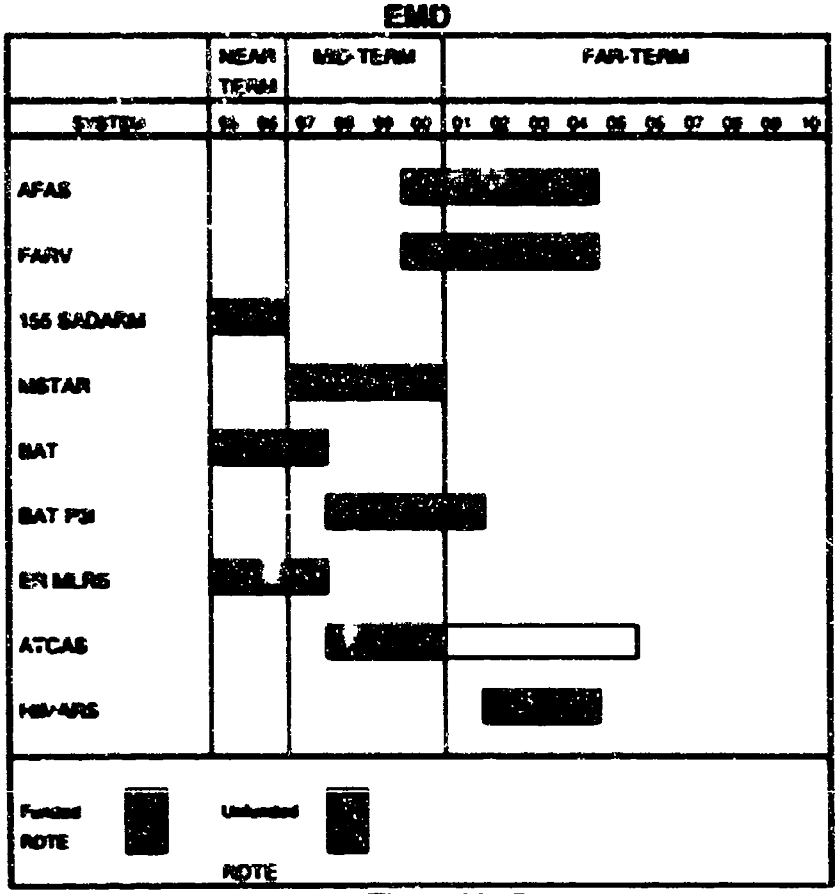


Figure H-15

• **155 Sense and Destroy Armor (SADARM)** - The 155mm SADARM projectile contains two SADARM submunitions in a base ejecting carrier, uses either the M577 mechanical or the M762 electronic time fuse, and is delivered in the same manner as other 155mm munitions. The 155mm SADARM has exceeded Operational Requirements Document (ORD) requirements in testing.

The MLRS SADARM P3I is currently one of the competing technologies for the MLRS Smart Tactical Rocket (MSTAR) program. *FUE: 3QFY 98*

- **Extended Range MLRS Rocket (ER MLRS)** - The ER MLRS offers greater range, improved accuracy, and reduced grenade dud rates. The warhead payload is reduced, but accuracy is increased by incorporating a low-level wind measuring device and a "soft launch." The addition of a low cost guidance package to improve effectiveness is being considered. *FUE: 1QFY 98*

- **MLRS Smart Tactical Rocket (MSTAR)** - MSTAR will be a robust smart munition rocket primarily employed against counterfire targets but capable of attacking other moving or stationary, hot or cold targets. The munitions will be delivered by the extended range MLRS rocket. Various smart submunition candidates are currently being studied. *FUE: Unfunded*

- **Advanced Towed Cannon Artillery System (ATCAS, formerly LT WT 155 Howitzer)** - The ATCAS program is currently examining options for a lightweight 155mm Howitzer. The Army is cooperating with the U.S. Marine Corps to identify a 155 Howitzer which weighs approximately 10,000 pounds, can achieve 30-40 km range with current rocket assisted projectiles, and can be highly mobile. The ATCAS can be emplaced within three minutes and will replace the M198. *FUE: Unfunded*

- **High Mobility Artillery Rocket System (HIMARS)** - HIMARS is based on the need for a lighter weight, more deployable rocket and missile system that can be sent anywhere in the world to provide the commander with lethal, long-range fires at the very beginning of a conflict. HIMARS, a wheeled launcher for the MLRS family of munitions (MFOM), will be C-130 transportable to facilitate rapid relocation within theater. HIMARS will fire the entire MFOM and will have a maximum crew of three. *FUE: FY 08*

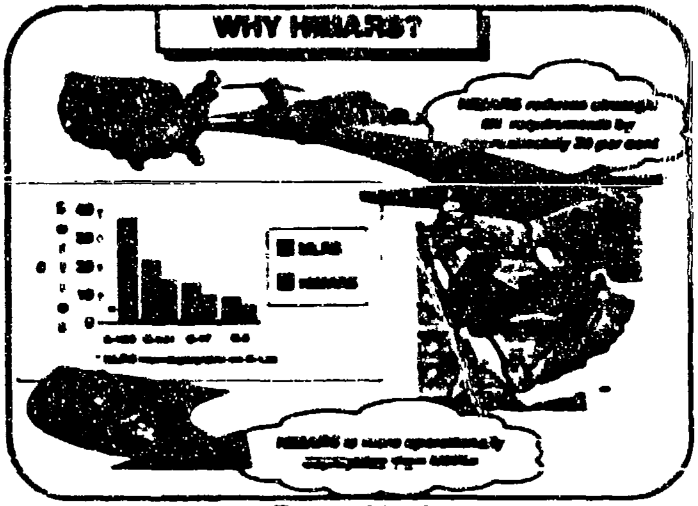


Figure H-16

PROCUREMENT

The payoff for RD&A is putting quality equipment in the hands of soldiers. Whether a new product or a nondevelopmental item, the goal is to ensure tomorrow's field artilleryman receives the best equipment.

Production

Most of the systems shown are resourced, but the scheduled procurement for some has been modified within the last year.

PRODUCTION

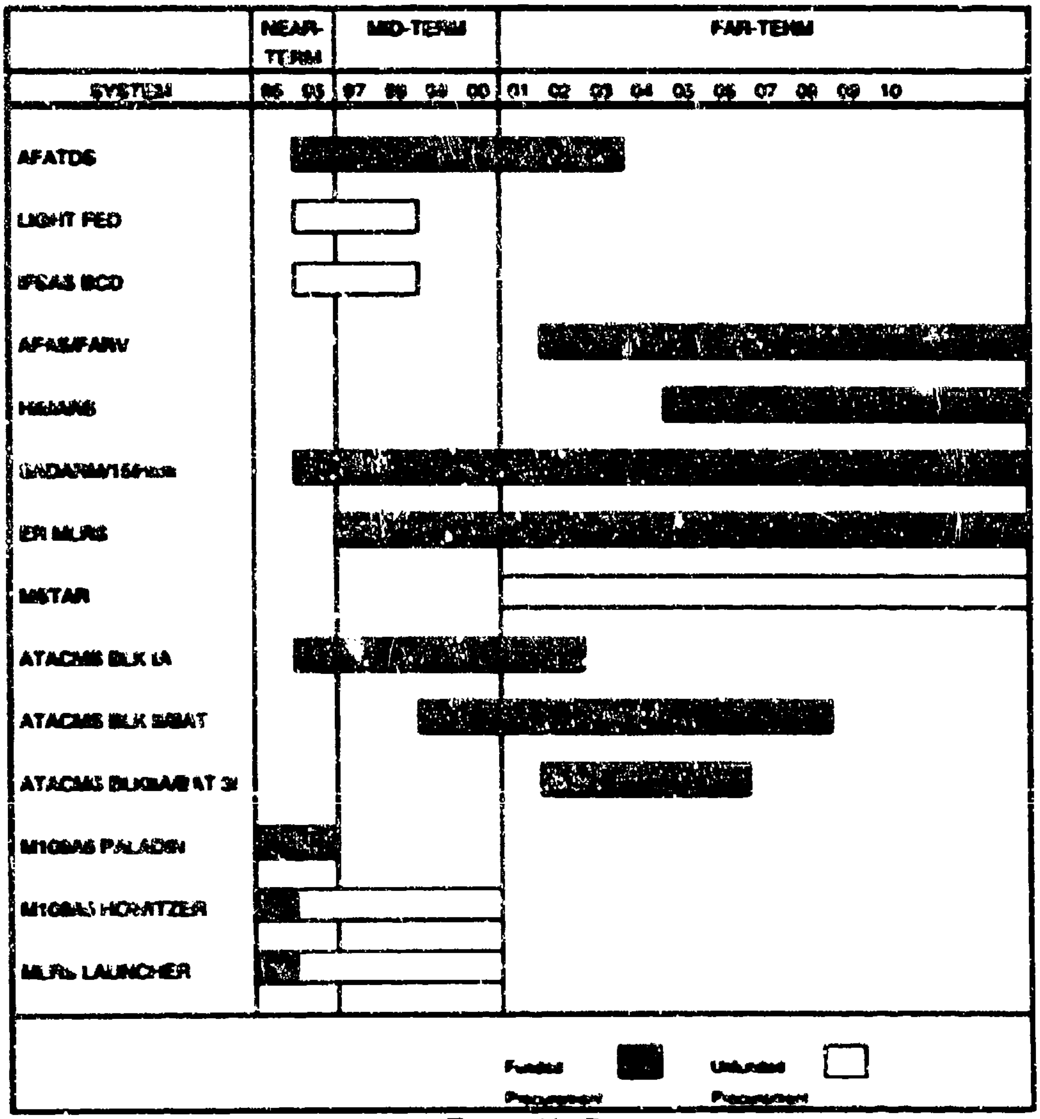


Figure H-17

• **Advanced Field Artillery Tactical Data System (AFATDS)** - The AFATDS broadens and modernizes the Army's Fire Support Command and Control system. AFATDS provides automated fire support for planning and execution of close, counterfire and interdiction operations. AFATDS automatically implements a commander's detailed guidance for planning and execution to include movement control, target value analysis, fire support coordination and attack. AFATDS performs automation functions at any level from corps to battery or company. The program has experienced a one year delay due to hardware and software problems which surfaced during Force Development Test and Experimentation. The execution speed of the system has been greatly improved by porting the software to run on a Reduced Instruction Set Computer (RISC). ***FUE: 4QFY 95***

• **Lightweight Forward Entry Device (LFED)** - The LFED will be used by platoon forward observers and field artillery aerial observers to compose, edit, transmit, receive, store, display messages, and process data used in the conduct of fire support operations. The LFED is approximately half the size of the FED fielded to our heavy divisions. ***FUE: Unfunded***

• **Initial Fire Support Automation System Brigade, Corps and Divarty (IFSAS BCD)** - IFSAS BCD replaces the obsolete Tacfire hardware with the Lightweight Computer Unit (LCU) at field artillery brigades, and corps and division artillery headquarters. The LCU will run AFATDS software when fielded. The software is being developed, and fielding is ongoing. ***FUE: 3QFY 95***

• **Multiple Launch Rocket System (MLRS)** - Funding for procurement of the MLRS launcher ends after FY 95. This combat proven system will remain the backbone for long-range counterfire within the active component. Fiscal constraints currently preclude fielding to the entire force. ***FUE: FY 83***

• **Howitzer, 155mm, M109A6** - Funding for procurement ends after FY 96. The M109A6 Paladin extends the range of the M109 series howitzer to 30 km (using the M203 propelling charge and rocket-assisted projectiles) and enables units to adopt shoot-and-scoot tactics that increase survivability and responsiveness. Fiscal constraints currently preclude fielding to the entire force. ***FUE: FY 93***

• **Howitzer, 155mm, M109A5** - The M109A5 adds a modified armament system which is the same cannon used on the Paladin to the M109A4. The system provides numerous improvements over the M109A2/A3. When fully funded, the M109A5 will be fielded to National Guard units which do not receive the Paladin. ***FUE: 1QFY 92***

NONDEVELOPMENTAL ITEMS (NDI)

If equipment already developed can meet fire support requirements, it will be procured off-the-shelf. This normally means modern equipment reaches our soldiers more quickly. Several changes have occurred in funding during the last year.

NONDEVELOPMENTAL ITEMS
NDI

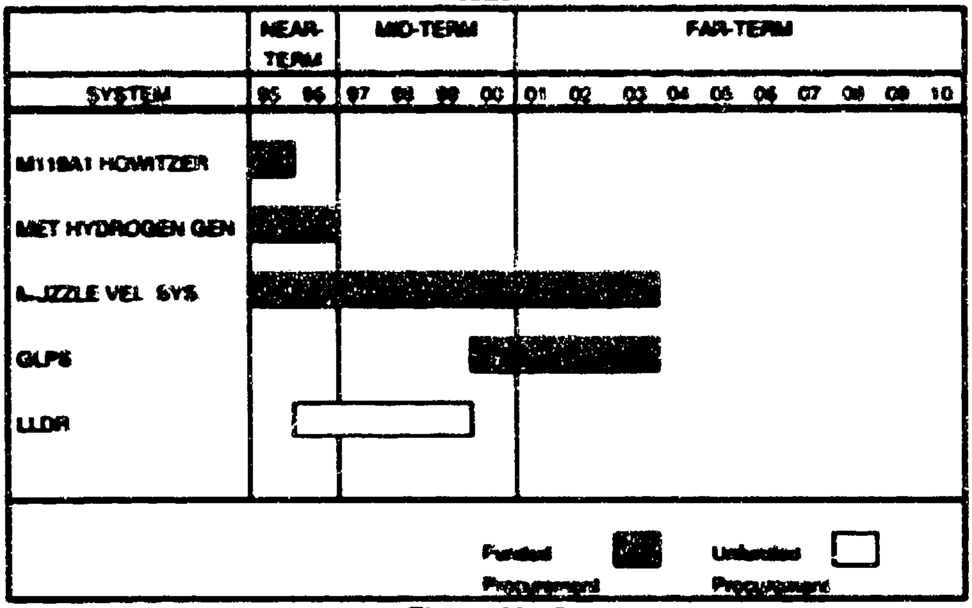


Figure H-18

- **Meteorological Hydrogen Generator (MHG)** - The MHG provides additional capability to units equipped with the Meteorological Measuring System, AN/TMQ-41 and earlier met equipment. With the MHG sufficient hydrogen gas is available for flying meteorological balloons often enough to maintain the accuracy required for accurate predicted fires. MHG along with CAAMS, TAMSS, and MVS are essential accuracy equipment for Paladin and in the future will support the improved accuracy of AFAS. ***FUE: 3QFY 96***

- **Howitzer, Lightweight, Towed, 105mm, M119A1** - The M119A1, a towed, lightweight 105mm Howitzer operated by a crew of seven, is capable of being emplaced and displaced within three minutes. It has low angle, high angle, and direct fire capabilities through 6400 mils while mounted on a firing platform. It is air transportable and air droppable and can be lifted by Army UH-60 and CH-47 helicopters. The prime mover is the M1097 HMMWV. Production funding for the M119A1 has been terminated; it has been fielded to only 55 percent of the 105mm units. ***FUE: 1QFY 90***

- **Muzzle Velocity System (MVS)** - MVS replaces the aging M90 chronograph currently in use. The MVS provides a lightweight, modular, man-portable system

capable of measuring the muzzle velocity of all types of field artillery rounds to include baseburner. It processes muzzle velocities, provides data to correct for nonstandard tube conditions, and communicates with the Paladin onboard fire control computer. In non-Paladin units the Battery Computer System and follow on systems use the data provided by MVS to achieve required accuracy. Procurement has been delayed as materiel developers select the most capable system. *FUE: 4QFY 96*

- **Gun Laying and Positioning System (GLPS)** - GLPS is a combined Global Positioning System and azimuth gyro for positioning non-Paladin Howitzers. GLPS also has a laser range finder to accurately locate each Howitzer position. The GLPS allows reductions in required survey personnel and equipment. The savings in personnel and maintenance cost, compared to the current survey system Position and Azimuth Determining System (PADS), means GLPS reduces cost while it increases capability.
FUE: FY 00

- **Lightweight Laser Designator Range finder (LLDR)** - LDR is a combined laser range finder, thermal sight, and laser designator for the light forces. The currently fielded system, Ground/Vehicular Laser Locator Designator (G/VLLD), is outdated, costly to maintain, and too heavy for practical transport by dismounted troops. The need to designate for Copperhead or Air Force delivered smart munitions remains.
FUE: Unfunded

SUMMARY

While funding for Army modernization has decreased, the fire support community has maintained funding for those systems most capable of supporting near-term plans and those which form the basis of Force XXI artillery.

SECTION 5

TRAINING

TRAINING STRATEGY

Fire support training focuses on live fire training, performance-based training and combined arms training. Future training systems will increase the use of training devices which allow improved results with reduced costs. In the future major weapon systems will have onboard training and simulation capability known as Embedded Training (ET) which can provide individual, crew, functional, or force-level sustainment training. Each AFAS/FARV will have an ET capability which provides sustainment training on operations and maintenance procedures. This ET capability will include Distributed Interactive Simulation (DIS) protocols and common terrain databases, plus visual and voice technologies to ensure compatibility with the family of Combined Arms Tactical Trainers (CATT).

In addition to individual and crew training, the AFAS/FARV will provide force-level training from section to battalion and will have the ability to accept scenario data from other systems such as the Family of Simulations (FAMSIM). AFAS/FARV crews in their motor pool or close-in training area will be able to participate in sophisticated force-on-force training exercises using their full range of communications and mission planning systems, all without expending ammunition and fuel, and without wear and tear to combat systems associated with conventional field exercises.

TRAINING AIDS, DEVICES, SIMULATORS AND SIMULATIONS (TADSS)

In addition to system-specific training devices, the Hellfire Ground Support System (HGSS), an eye-safe laser designator and range finder device for use in MILES/AGES II exercises, replaces the Ground/Vehicular Laser Locator Designator (G/VLLD). The HGSS is to be used at our CTCs and at USAFAS. Six go to each direct support 155mm battalion, others to the CTCs and USAFAS. ***FUE: 2QFY 96***

CONCLUSION

AFAS/FARV will lead fire support systems to the future of Force XXI training. The goal of Fire Support training is to integrate all members of the Fire Support System of Systems--to include target acquisition, command and control, sustainment, and weapons--into the comprehensive training system of the future. Only by ensuring all areas of Fire Support are included in the revolution in training technology can we continue to provide the overwhelming fires necessary for victory with minimum casualties. For further information on Army-wide training initiatives and issues, and a detailed explanation of fielding and funding status, consult Annex R (Training) to this Plan.

SECTION 6

CONCLUSION

The role of the Army in providing deep precision strikes for the joint force commander is clearly stated in the joint doctrine. Current doctrine allows us to enhance our ability to apply combat power from multiple dimensions in the same area of the battlefield instead of "reserving" various areas for specific Services. The modernization plan laid out in POM 96-01 provides the Army with improved capabilities to conduct interdiction fires. BAT, BAT P3I, ATACMS BLK II, ATACMS BLK IIA, HIMARS and Firefinder P3I contribute to the joint team by enhancing our capability to strike the enemy at increasing depths, at greater tempos, and with greater lethality.

The AFAS/FARV system allows unprecedented concentration of fire power to shape the close fight while developing breakthrough armored vehicle technologies with wider application. The Army's ability to win the counterfire battle is further enhanced by fielding SADARM, ER MLRS and MLRS IFCS and ILMS. The overall effect of the Fire Support modernization plan is a balanced program to move Army indirect fire systems toward the systems required for Force XXI.

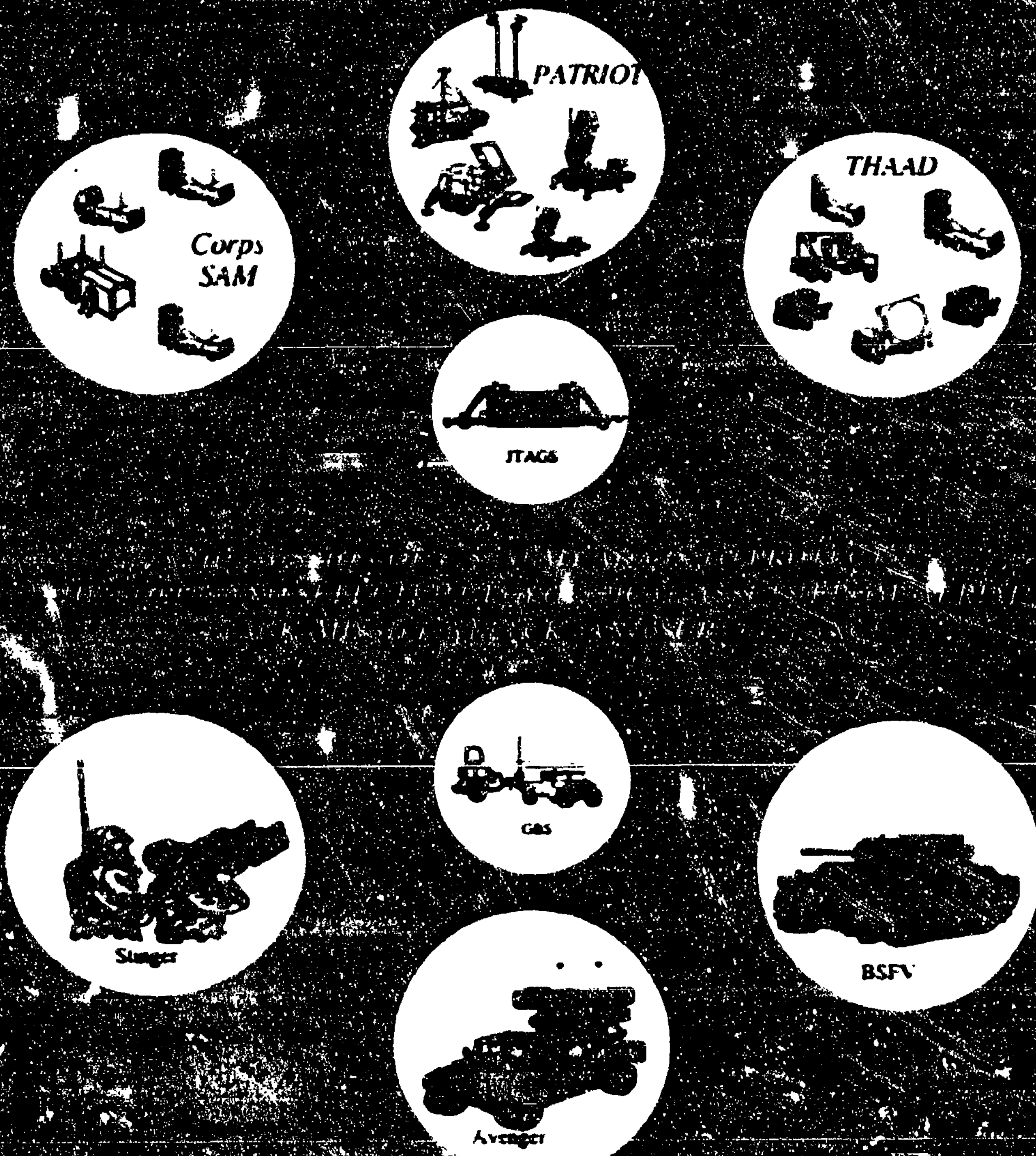
POM FY 96-01

DOES:		DOES NOT:
AFAS/FARV		Field MLRS to all required units
BAT and BAT P3I and ATACMS Block II and IIA		Fund development of MLRS smart tactical rocket
ATACMS BLK IA		Fund ATCAS
Firefinder P3I		Field HIMARS until FY 2008
AFATDS		Field M109A6 to all required units
155mm SADARM		Field M119A1 to all required units
MLRS IFCS and ILMS		Field FAASV to all required units
ER MLRS		Fund anti-emitter munition

Figure H-19

ANNEX I

AIR DEFENSE ARTILLERY



ANNEX I

AIR DEFENSE ARTILLERY

SECTION 1

INTRODUCTION

To fulfill the U.S. National Military Strategy, the military must thwart all aggression through credible deterrence backed by robust warfighting capabilities. Should deterrence fail, the military must be able to fight and win our nation's wars. The Army Chief of Staff directs a force modernization strategy that ensures the Army is able to:

- win quickly with minimum casualties;
- maintain Land Force Dominance; and
- meet the challenges of the 21st Century (Force XXI).

The battlefield of the future will be characterized by fast moving forces of unprecedented lethality. Declining resources will necessitate greater reliance on high tech weapons to offset reductions in the number of forces that can be brought to bear in times of crisis. In a world of rapidly proliferating weapons technologies, particularly unconventional weapons capable of producing mass casualties, the Army must be prepared to deter, and if deterrence fails, to fight. To ensure our forces and lethal systems--which contribute to the success of Land Force Dominance--are protected from air and missile attacks, a capable Air Defense Artillery (ADA) force must be on the scene at the start of a crisis. ADA forces are key players in the Army's strategy of taking out the enemy's "eyes" (i.e., Unmanned Aerial Vehicle (UAV), scout and reconnaissance helicopters, and satellites) to ensure our ground forces have the requisite freedom to maneuver on the battlefield.

Changes in force composition and modernization, as well as the shift in orientation of our Army from a forward deployed to a force projection posture, are consequences of the structure and funding drawdowns. Additionally, current global and national trends have influenced the direction of military modernization. Changes in the world threat have brought about a profound redefinition of the role of ADA.

The mission of U.S. Army ADA is to protect our forces and selected geopolitical assets from aerial attack, missile attack, and surveillance. Our success in Operation Desert Shield/Desert Storm (ODS) demonstrated how air attacks can deteriorate the effectiveness of an enemy force that has no credible air defense capability. It also demonstrated the tremendous battlefield and political impacts of cruise and tactical ballistic missiles. As a result of ODS, all military forces recognize the importance of being able to negate and counter the air and missile threat.

Air Defense Artillery modernization supports all of the Army modernization objectives, but primarily Protect the Force and Win the Information War. This Annex details and provides the rationale for the major ADA programs that support these objectives, ensuring our Army's ability to attain the overall goal of Land Force Dominance. It is a strategy for resourcing, developing, and fielding a trained and ready ADA force in support of the National Military Strategy. It describes the Army's current, near- and far-term plans for execution of the Air and Missile Defense programs. For an in-depth discussion of modernization efforts and status in the Theater Missile Defense (TMD) area, see Annex J; modernization efforts for the National Missile Defense (NMD) area can be found in Annex U of this Plan.

SECTION 2

WARFIGHTING CONCEPT

Introduction

The military component of the National Military Strategy focuses on the use of military force as an element of national power. The military fulfills four fundamental requirements of the National Military Strategy: ensuring strategic deterrence and defense, exercising forward presence in vital areas, responding effectively to crises, and retaining the national capacity to reconstitute forces. A credible Air Defense Artillery force is a formidable deterrent to any air or missile attack because it causes the enemy to weigh very heavily the potential consequences of a first strike that will do nothing more than cause an overwhelming counterattack by the United States and its allies. If deterrence should fail, Air Defense Artillery is critical to: ensure safe arrival of our forces into a theater; provide a protective umbrella over them once in theater; allow freedom to maneuver on the battlefield; and, provide the requisite protection to reconstitute forces.

How we fight and defeat current and future aerial and missile systems that represent potential air threats to U.S. forces and critical assets throughout the world is driven by the Threat, Joint Doctrine, Army Doctrine, and the ADA Mission.

Threats. The primary threats that must be countered by air defense forces are depicted in Figure I-1. Whereas past ADA forces were primarily concerned with the fixed wing threat, future threats focus more on rotary wing aircraft, UAVs, cruise missiles, and ballistic missiles. Recent concern has focused on the control and disposition of military assets, particularly weapons of mass destruction. Proliferation will increase, with emphasis on sales, upgrades, and conversions.

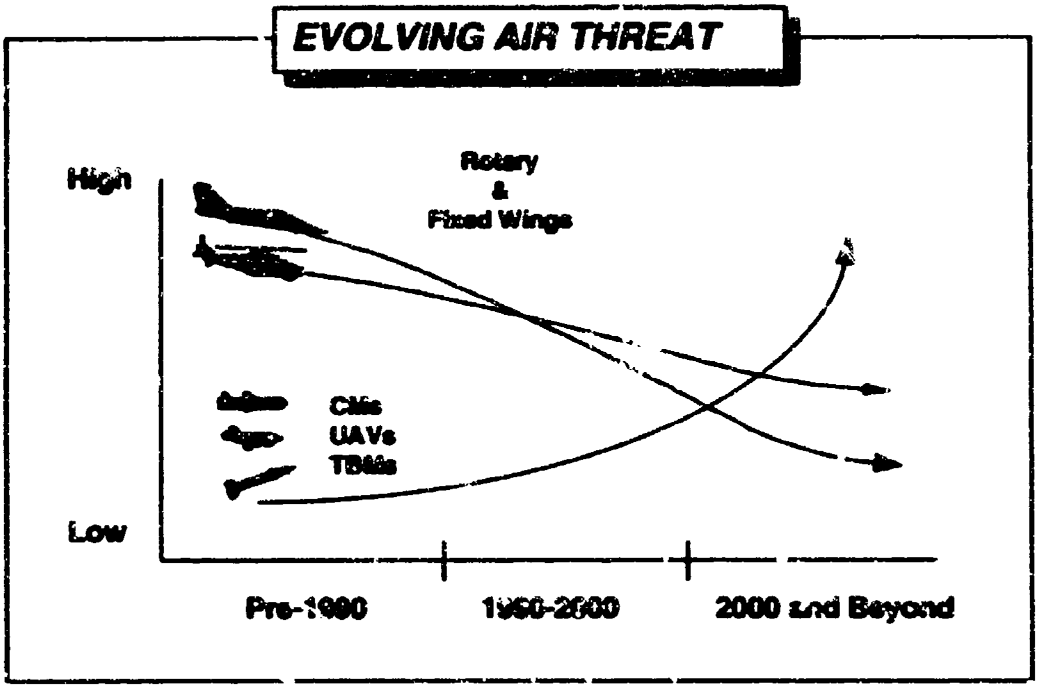


Figure I-1

Low cost cruise missiles (CM) and Unmanned Aerial Vehicles (UAVs) are highly cost effective and are becoming more common, particularly among nations with limited capital assets.

The use of Tactical Ballistic Missiles (TBMs) continues to be a significant concern. As shown in ODS, TBMs are a serious threat against U.S. forces and our allies. As technology advances, the ranges of these TBMs will increase, allowing a regional power to extend its area of influence.

Rotary wing (RW) technology is also expanding. Rotary wing improvements including fire control, munitions, avionics, and other items available for purchase on the international market make attack and armed helicopters more survivable and lethal than ever, posing a significant threat to forces in close combat.

The fixed wing (FW) threat will have smaller quantities overall, and the joint arm (U.S. Air Force, Navy, and Marine Air) can be expected to deal effectively with the FW threat. ADA will primarily be concerned with Fixed Wing (FW) "leakers" only as a collateral mission.

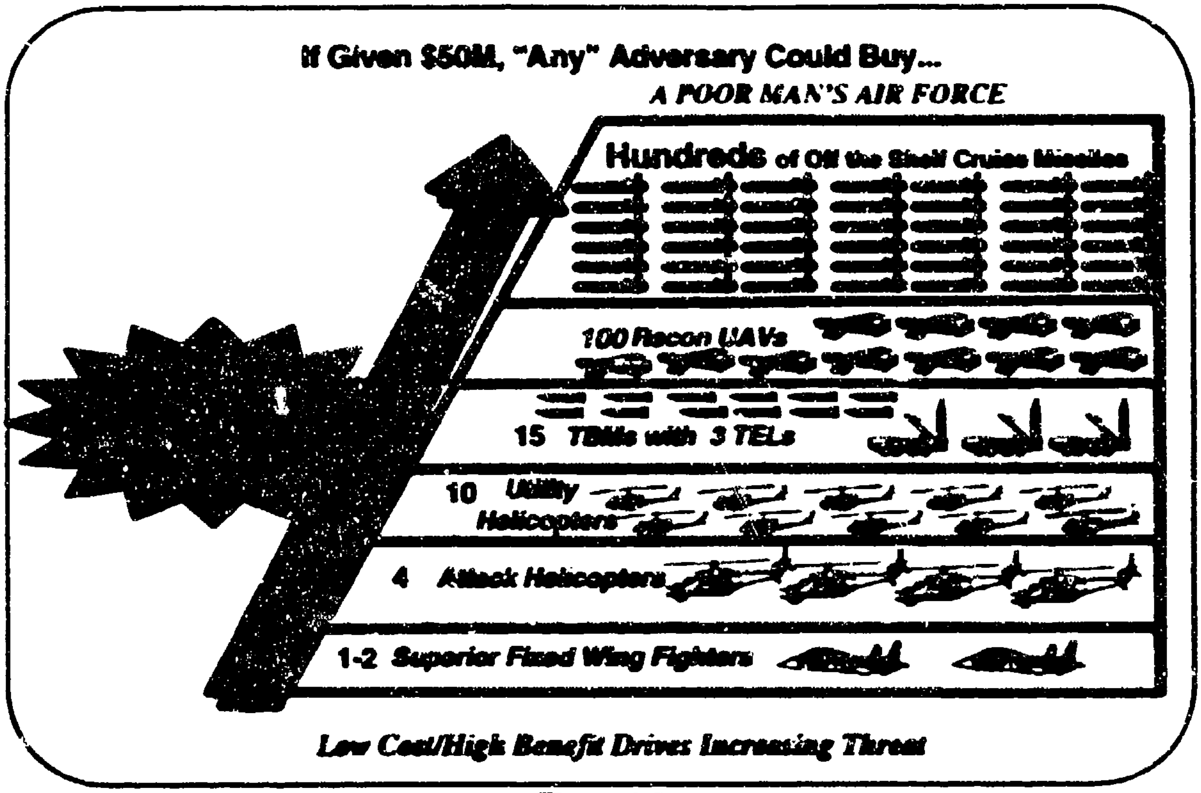


Figure I-2

Nations that currently lack adequate weapons technologies will not find it difficult to locate the sources from which to procure such technologies, or even the actual end products of technologies. For a relatively small investment a country or group can procure from the expanding world weapons market a "Poor Man's" Air Force. The variety of aerial systems that can be bought with $50M is shown in Figure I-2.

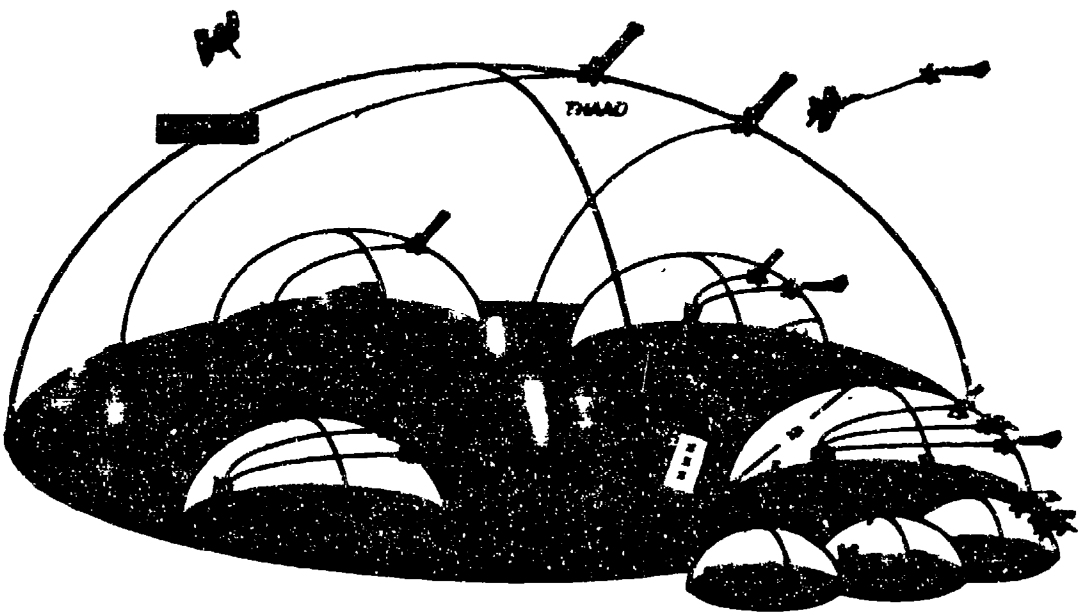
Joint Doctrine. *Joint Pub 3-0, Doctrine for Joint Operations*, charges air defense assets to participate in the aerospace defense mission through synchronized, integrated joint campaigns and major operations, with the overall goal of increasing the total effectiveness of the joint force, while projecting focused capabilities that present no seams or vulnerabilities for an enemy to exploit. Early entry forces should deploy with sufficient organic and supporting capabilities to preserve their freedom of action and protect the force and equipment from potential or likely threats. The Joint Force Commander (JFC) will normally want air and maritime superiority early in the conduct of joint operations. Additionally, the JFC will want C4I superiority immediately and, space control is a necessary precursor to this superiority. The JFC will use space assets to observe and assess the enemy's intentions, capabilities, and actions, while concurrently depriving the enemy the ability to use his space-based assets to seek similar information about friendly forces. Neutralization of the enemy's weapons of mass destruction (WMD) is also a key goal of the JFC. It is not only the sheer killing power of WMD that represent profound effect, but also their operational, psychological, and political impact, any of which can affect strategic objectives and campaign design.

Finally, joint forces must consider interoperability with multinational forces, as the trend to operate in a combined environment becomes more prevalent.

Army Doctrine. FM 100-5, Operations, June 1993, focuses on the integration of Army operations with joint and combined forces and on the fundamentals of force protection to implement National Military Strategy. Protection of the force during early entry operations is a key element of our National Military Strategy and an essential objective of Army modernization. Once in theater, Army forces must have freedom to maneuver to achieve the goal of Land Force Dominance. Effective, versatile, and synchronized air defense capabilities will provide the required freedom to maneuver.

ADA Mission. The mission of U.S. Army ADA is to Protect the Force and selected geopolitical assets from aerial attack, missile attack, and surveillance. Doing so ensures that ground commanders can dominate battle space to achieve decisive victory by winning quickly with minimal casualties.

INTEGRATED AIR DEFENSE



ADA MISSION: PROTECT THE FORCE AND SELECTED GEOPOLITICAL ASSETS FROM AERIAL ATTACK, MISSILE ATTACK, AND SURVEILLANCE

Figure I-3

Force Projection Operations. Force projection operations normally occur in a sequence of stages: Mobilization, Predeployment Activities, Deployment, Entry Operations (including expansion and buildup), Decisive Operations, Postconflict or Postcrisis Operations, Redeployment, and Demobilization. The stages often blend with one another and are sometimes concurrent. On the contrary, ADA forces do not perform in stages. ADA forces must provide continuous protection for the entire force,

in synergy with joint and multinational air defense elements, throughout all phases of operations.

In armed conflicts, ADA forces are required throughout the theater of operations, while simultaneously maintaining strategic protection of the United States. ADA weapons which may be employed include high to medium and low altitude air defense systems such as PATRIOT PAC-2, HAWK, Stinger Manportable Air Defense System (MANPADS), Avenger, and Bradley Stinger Fighting Vehicle (BSFV), with future additions of PATRIOT PAC-3, Theater High Altitude Area Defense (THAAD) and Corps Surface to Air Missile System (Corps SAM) systems. In order to integrate these systems, effective near real time C4I information is needed to optimize individual ADA weapon system performance. Interoperability allows the Army to fight as part of a joint team. ADA communications systems must be compatible with joint/multinational systems and operate in common, shared data distribution architectures. Sensors must provide an integrated air picture that can be distributed throughout the battlefield.

Deployment and Entry Operations. In deployments where the threat of aerial and missile attacks exist, ADA units deploy with the initial force. Due to limited airlift capability, the lighter, multithreat capable systems such as Avenger and Corps SAM are the preferred systems for early deployment.

Early deployment of missile defense and counter-Reconnaissance, Surveillance, and Target Acquisition (RSTA) capability is crucial to the success of early entry operations. Deploying forces are most vulnerable during the initial stages of the build-up. Theater Missile Defense forces establish a two-tiered enclave (PATRIOT/THAAD, Corps SAM/THAAD, or PATRIOT/Corps SAM/THAAD) to protect the lodgment area, geopolitical assets, and the debarking forces against ballistic and cruise missiles. Counter-RSTA units deny the enemy targeting information which is key to sustaining a productive aerial or missile attack.

Corps and divisional ADA units complement Theater Missile Defense forces by providing protection against short range tactical missiles, cruise missiles, fixed wing leakers and helicopters, and by limiting observation by UAVs. Countering threats successfully during deployment and entry operations requires missile defense assets to either be forward deployed, or deployed with the first airlifts.

AIR DEFENSE IN DEPLOYMENT AND EARLY ENTRY

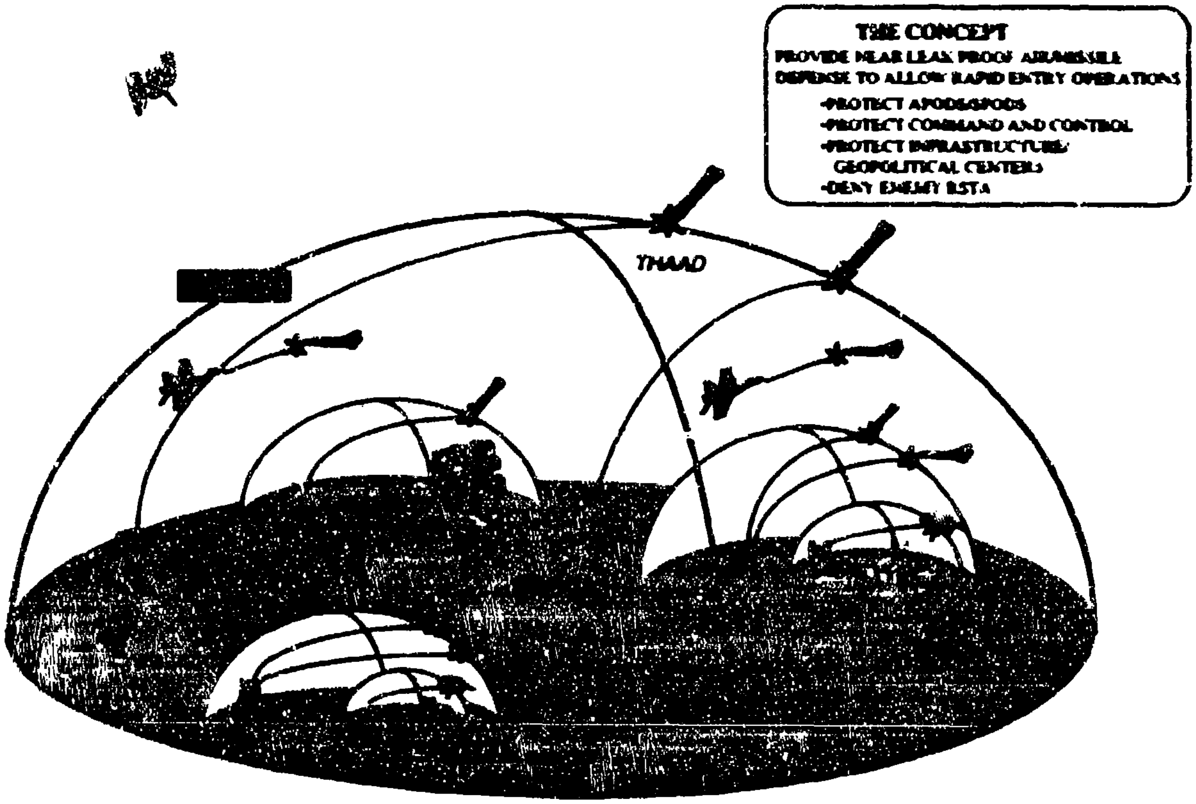


Figure I-4

Expansion and Buildup. As the joint force expands the lodgment area, ADA units continue protecting the force and geopolitical assets, and deny enemy reconnaissance throughout the area of operations. Threat forces will attempt to determine force size and locations, strengths, movements, and destinations. The most likely source of this information is the RSTA UAV. The enemy will use this intelligence to direct aerial and artillery strikes against forces massed along their routes or in assembly areas.

As our forces continue to build, additional PATRIOT and Corps SAM systems arrive to augment the initial theater defense. THAAD and PATRIOT continue to defend air and sea ports of debarkation and selected geopolitical assets. Corps SAM transitions to protection of maneuver forces, moving into and within assembly areas. Forward Area Air Defense (FAAD) systems (Avenger, BSFV and MANPADS), in synergy with Corps SAM, screen forward and to the flanks of assembly areas, denying enemy aerial RSTA efforts and securing the element of surprise.

AIR DEFENSE DURING EXPANSION AND BUILDUP

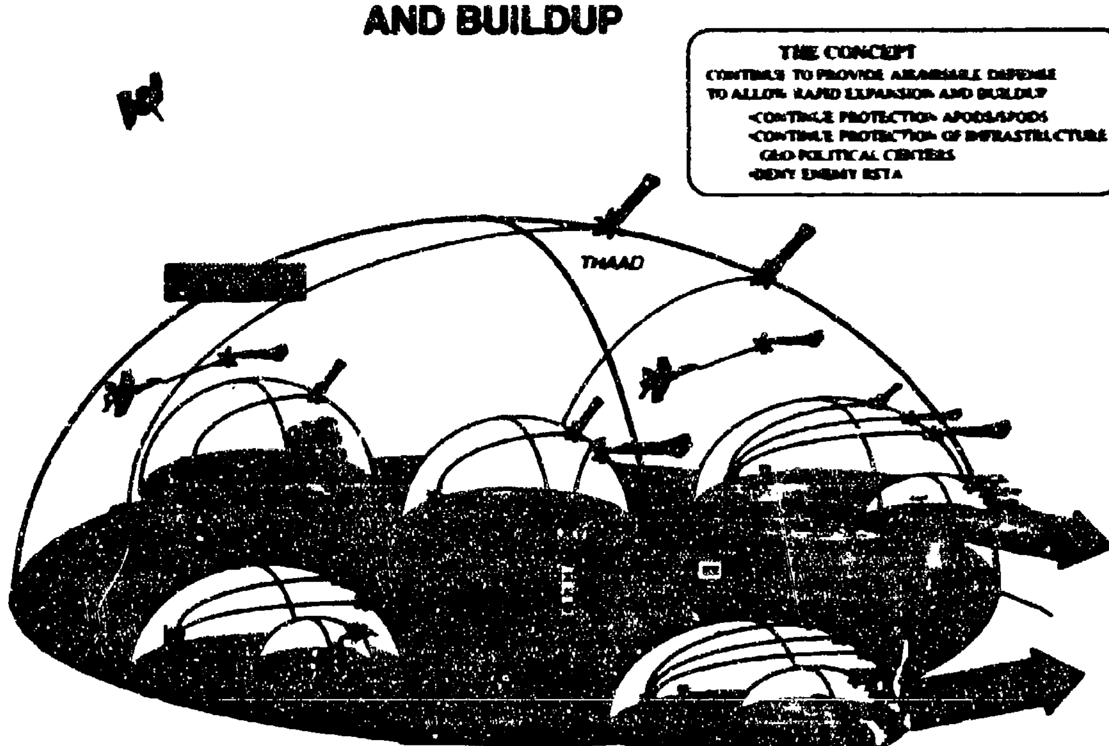


Figure I-5

Decisive Operations. The force commander's goal is to achieve a quick, decisive victory with minimum casualties. The maneuver commander seeks freedom of movement on the battlefield to exploit his ability to move fast and concentrate his overwhelming firepower. Enemy RSTA UAVs will attempt to determine force locations, strengths, movements, destinations, and objectives. The enemy will seek to launch air, missile and artillery strikes against moving forces; reserve troop concentrations; logistical refueling and rearming points; and choke points. Additionally, lethal UAVs may be used to attack armored vehicles and RW aircraft will attack the flanks of maneuvering forces.

Once decisive operations begin, ADA units focus on denying or limiting RSTA by UAVs and defeating attacks by aircraft and theater missiles. Corps SAM and FAAD systems provide coverage to the Corps' maneuvering forces and critical assets, such as forward rearm and fueling points and potential choke points. These systems must be placed close to the line of departure to ensure coverage of mobile forces moving into close combat areas. Also, continued protection of ports of debarkation and selected geopolitical assets is required in decisive operations. Once the decisive battle is begun, FAAD systems become even more important. These systems will be positioned along routes of advance, providing early warning of threat aerial vehicles and continuous air defense for advancing armored and mechanized forces.

The primary threat to armored and mechanized forces in close combat is RW aircraft. To counter this threat, BSFVs accompanying maneuver forces are positioned with lead maneuver elements, and weighted toward the flanks of the formations. Avengers, positioned along routes of advance and to the maneuvering force's flanks, counter threat RSTA and lethal UAV sorties. MANPADS teams augment Avenger coverage. Ground-Based Sensors (GBS) provide cueing information to FAAD systems supporting the force.

AIR DEFENSE DURING DECISIVE OPERATIONS

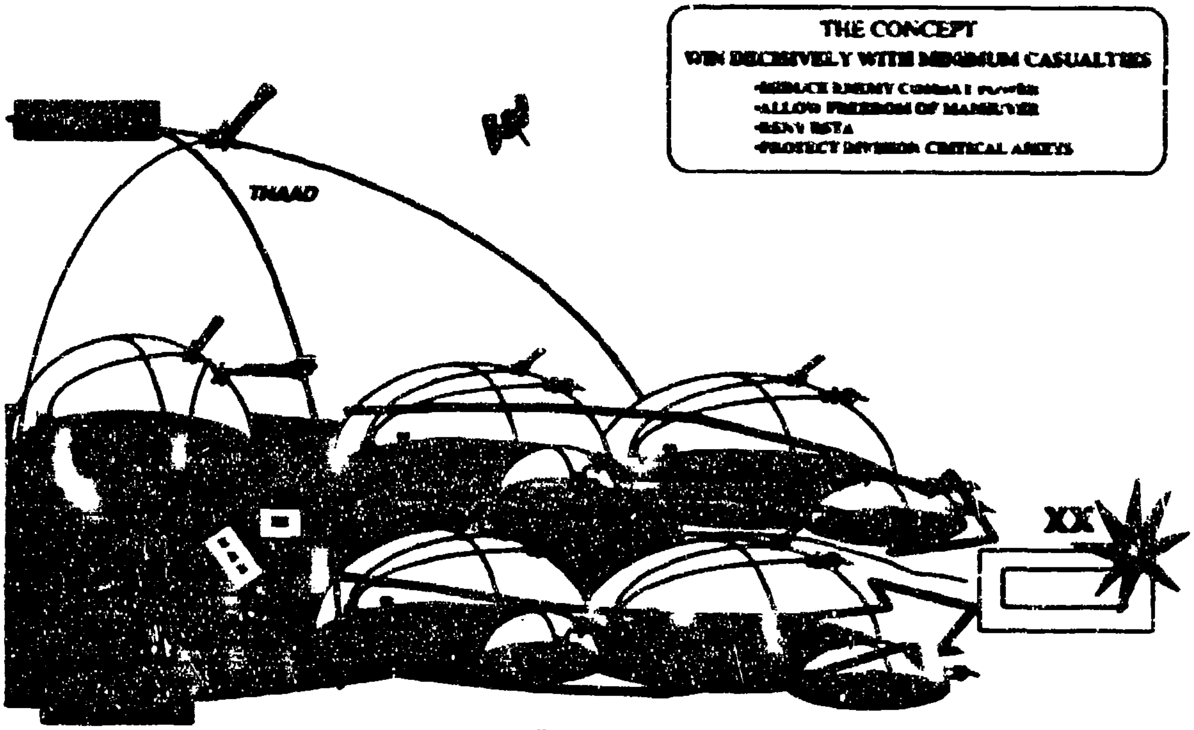


Figure I-6

Postconflict Redeployment. During postconflict and redeployment operations ADA units provide force security and prevent surprise. This ensures unimpeded reconstitution of forces which remain in the area as well as unopposed embarkation of forces no longer required. However, because hostilities could resume at any time, it is vital that friendly forces remain protected throughout such operations. The character of the threat during these stages of operations is akin to threats faced during entry operations, although the number of platforms available to the enemy are likely to have been reduced significantly through attrition.

Operations Other Than War. ADA forces may be deployed any time the threat of air and missile attack, or the need for ground-based aerial surveillance exists. Because ADA forces are defensive, deployment of the ADA forces expresses our nation's resolve without being viewed by the enemy as escalating in nature.

Strategic Defense. In addition to supporting the force projection Army, ADA can also contribute significantly to strategic air defense. Future adversaries may launch air and missile strikes against national level command, control, and communications assets to disrupt the effectiveness of coalition warfighting operations. Such strikes may also target nonmilitary sites, as evidenced in ODS. ADA forces also have the specified operational mission of National Missile Defense--neutralizing the threat of accidental, unauthorized, or limited strikes against the U.S. with intercontinental ballistic missiles (ICBMs), sea-launched ballistic missiles (SLBMs); and satellite surveillance operations. Land-based weapons, sensors, and command and control systems must be fully integrated into a tiered architecture to defend against ballistic missiles. Anti-Satellite (ASAT) operations, designed to negate low earth orbit threat satellites, will deny the enemy's ability to utilize his satellite assets for military gain.

Tailoring the ADA Force. Air Defense Artillery has tailored its systems and the ADA force via the Total Army Analysis (TAA) and Program Objective Memorandum (POM) processes to counter threats to our contingency forces. Countering such threats is best addressed by ground based systems. The Air Force has no capability against TBMs in the terminal phase, due to detection difficulties and inadequate kill potential, and has limited capability against CMs, UAVs, TASMs, and RW aircraft. Cruise missiles and TASMS, particularly low altitude missiles, are difficult to detect and kill due to the clutter of the earth's background when viewed from an aircraft. UAV and RW aircraft threats operate at altitudes and locations where air to air combat is doctrinally avoided. The tailoring of our ground-based air defense force (which continues through subsequent TAAs as we move to Force XXI) is designed with the intent of making them synergistic and complementary to joint capabilities, rather than redundant and duplicative.

Summary. ADA is an indispensable contributor to the Army's objective of decisive victory with minimal casualties in force projection operations, in operations other than war, and in strategic defense. ADA forces are tailorable; they contribute to control of the skies, provide sufficient force protection to ensure tactical forces have freedom to maneuver, protect critical warfighting capabilities, and defend key geopolitical and population areas within the theater, allied countries, and the United States. ADA supports all the Army's modernization objectives, but primarily Protect the Force and Win the Information War, thus ensuring America's Army maintains the ability to achieve Land Force Dominance.

SECTION 3

CURRENT PROGRAM ASSESSMENT

Introduction

This section provides assessments of the Program Objective Memorandum (POM) FY 96-FY 01 resourced ADA forces and their associated modernization programs. The program assessments are based on the threat capabilities, Army/Joint Doctrine, the modernization level of forces programmed to be available in the near-, mid- and far-terms, and established ADA missions and requirements. The results identify strengths and weaknesses in the ADA force's ability to meet its mission requirements. Programs are rated as follows:

> **RED** -- No capability exists, or is insufficient to defeat the threat or provide the required support;
>
> **AMBER** -- A limited capability or quantity exists to perform the mission; and
>
> **GREEN** -- Adequate capability and quantity exists to perform the mission.

Assessment Methodology. The assessment process is a systematic comparison of ADA and threat capabilities during three distinct time frames: near-term (FY 95-96), mid-term (FY 97-00) and far-term (FY 01-09). The assessments account for growth in system capabilities and quantities as currently funded in the POM and EPP. The assessments evaluate the capabilities and quantities of systems required to protect early entry operations, expansion, decisive operations, and strategic protection of the United States.

Requirements. Air Defense missions and requirements are depicted in Figure I-7. The ADA force must be sufficiently robust to support the ability of the military to "win two nearly simultaneous major regional conflicts."

	Phase	Mission	Capability Requirements
Contingency Operations	Entry	Protect troop and logistical concentrations Counter-RISTA Counter unconventional warheads Protect geopolitical assets	Detect, identify, engage [illegible] tactical missiles with mass destructive warheads Detect, identify, engage rotary wing, cruise missiles, fixed-wing [illegible], lethal UAVs, and low observable air platforms Limit / deny UAV observation of the force Alert the force of threat aerial presence and location Provide tactical missile defense to seats of government and population centers Interoperate with joint / combined force air defense / air control elements
	Expansion	Protect troop concentrations Counter-RISTA Counter unconventional warheads Protect geopolitical assets	Detect, identify, engage [illegible] and low observable air platforms Deny UAV observation of the force Detect, identify, engage ([illegible]) tactical missiles with mass destruction warheads Provide tactical missile defense to seats of government and population centers Maintain integrated C3I with supported force Alert the force to threat aerial presence and location Tactically redeploy tactical missile defense units by air Provide timely back-tell of tactical missile launch point data to [illegible] other elements Interoperate with joint / combined force air defense / air control elements
	Decisive Operations	Protect the force Allow freedom to maneuver Counter-RISTA Reduce enemy combat power Protect geopolitical assets	Deny UAV observation of [illegible] Detect, identify, engage helicopters Detect, identify, engage cruise missiles, lethal UAVs, and other low observable platforms Maintain integrated C3I with supported force Maintain [illegible] air defense in close battle area Alert the force of threat aerial presence and location Provide timely back-tell of tactical missile launch point data to [illegible] other elements Maintain mobility commensurate with the supported force
CONUS Operations		Protect the United States Deny / negate satellites	Detect, [illegible], identify, engage [illegible] Integrate C3I with [illegible] assets Detect, identify, engage satellites

Figure I-7

Current Assessment. The current Air Defense Artillery (ADA) force contains a complementary mix of low and medium to high altitude air defense systems supported by improved C3I capabilities. Key new or improved systems that began fielding during FY 94 include FAAD Command and Control (C2) Block I; Light and Special Division Interim Sensor (LSDIS); and, the PATRIOT Quick Response Program (QRP)/Guidance Enhancement Missile (GEM). The Avenger system is fielded to most divisions and corps units, and the Bradley Stinger Fighting Vehicle (BSFV) is fielded to most heavy division ADA battalions. HAWK and Chaparral missile systems have been removed from the active force and exist in the National Guard.

Early Deployment Operations. Early deploying ADA systems include: Avenger, to accompany light, special and heavy divisions plus corps elements; MANPADS teams, LSDIS, and FAAD C2 to accompany light and special divisions; and PATRIOT, to deploy with corps elements (although some PATRIOT may be prepositioned as theater assets).

Target acquisition for FAAD weapon systems is provided by the capabilities of the LSDIS (units without LSDIS use Manual Shorad Control System (MSCS) teams) and any early warning received from adjacent and higher units via established C2 nets.

Additionally, in that all FAAD systems are Stinger based, their ability to counter threat rotary wing, UAV (recon and lethal), and cruise missiles is limited by the capabilities of the existing Stinger RMP missile.

Avenger. Stinger has a limited acquisition capability to counter rotary wing, UAV (recon and lethal), and cruise missiles threat. LSDIS cannot provide the precise threat positional data to direct the Avenger's onboard forward looking infrared (FLIR) sensor at the target (so that the target will appear in the sensor's narrow field of view). Also, the requirement to visually identify aerial platforms as friend or foe before engaging cannot generally be met beyond 2 kilometers (km). Thus, Avenger cannot ensure destruction of enemy platforms prior to accomplishing their mission.

Chaparral. This system arrives with follow-on forces and will thicken rear defenses. These units have no organic sensors so they are totally dependent on visual detection of targets and/or receipt of early warning via established C2 nets.

PATRIOT PAC-2. This system provides good capabilities against much of the current TBM spectrum, although it has a small defended area footprint and cannot assure destruction or neutralization of TBM warheads. Also, PAC-2 does not always detect and engage low radar cross section (LRCS) targets, such as cruise missiles. However, when prepositioned near assembly areas, PAC-2 can alleviate some of the tactical missile threat before and during movements. Expansion operations require supporting elements to move with and cover the force; PAC-2 has substantial tactical mobility shortfalls.

HAWK. HAWK units arrive with follow-on forces to thicken the rear defenses. The units offer some additional cruise missile and UAV detection and engagement capabilities. Like the PATRIOT PAC-2, the HAWK has substantial tactical mobility shortfalls. Thus, its capability to move with and cover the force is likewise marginal.

Decisive Operations. The very nature of decisive operations demands that ADA systems provide extensive coverage of the maneuver force during both movement to and the conduct of close battle. Avenger units, MANPADS teams, and BSFVs will provide this coverage.

BSFV. BSFV is limited in its capability to counter rotary wing, UAV (recon and lethal), and cruise missiles threat. The requirement to stop the vehicle and dismount the MANPADS team causes the BSFV to become separated from maneuver forces and subjects the vehicle and its team to targeting by both direct and indirect fires. The lack of both an onboard sensor and early warning fire control mechanisms, impedes the ability of MANPADS teams to expeditiously locate and fire on targets, thus placing the maneuver force at greater risk. Also, the requirement to visually identify aerial platforms as friend or foe before engaging cannot be generally met beyond two km.

MANPADS Teams. MANPADS teams using the shoulder fired Stinger missile has a limited capability to counter rotary wing, UAV (recon and lethal), and cruise missiles threats. Again, the requirement to visually identify aerial platforms as friend or foe before engaging cannot be generally met beyond 2 km.

Strategic Realm. ADA has no currently deployed capability to counter intercontinental ballistic missiles, submarine launched ballistic missiles, or satellite threats.

Subjective evaluations of current capabilities and deficiencies lead to the near-term priorities (FY 95-96) listed in Figure I-8. These priorities are the baseline for material and doctrinal resolution during the near-term.

NEAR-TERM PRIORITIES

- Capable Tactical Missile Defense in support of force projection operations
- Improve and integrated C3I with the supported force
- Denial of UAV observation of the maneuver force
- Increase lethality against mass destruction warheads
- Defend maneuver forces against rotary wing, cruise missile, short range ballistic missiles, and other low radar cross section threats
- Increase weapon and friendly air effectiveness via positive identification
- Some capability against the strategic threat

Figure I-8

Near-Term Assessment (FY 95-FY 96). Products of significant RDTE efforts will come off production lines during the near-term. The introduction of the Block I version of the Stinger missile significantly improves the capability of receiving units. Stinger Block I eliminates super elevation requirements, extends missile shelf life and its operational/warfighting value (via a new battery), increases Infrared Countermeasures (IRCM) capability, upgrades low aspect angle engagement capability, and improves night firing capability. The Vulcan system (towed and self-propelled) will be out of the Army inventory as fielding of the Avenger concludes during this period, and all heavy division ADA battalions receive their BSFVs. Current BSFV has two critical shortcomings: crew vulnerability; and inadequate target engagement reaction timelines. As part of a Force XXI initiative, it will be feasible for BSFV crews to fire Stinger while under armored protection. This capability could be provided by the BSFV-Enhanced (BSFV-E). It integrates a Stinger Standard Vehicle Missile Launcher (SVLM); a Stinger seeker reticle superimposed in an integrated sight unit (ISU), modified fire control; position location/navigation capability; and the ability to receive,

display, and use FAAD C3I cueing information while on the move. The BSFV-E is a candidate system for TRADOC's rapid acquisition Tiger Team process; the objective of which is to accelerate acquisition and fielding of materiel system improvements via the TRADOC Battle Labs. The FAAD force is significantly improved with the additions of the Ground Based Sensor (GBS) and FAAD C2 Block II. Procurement and the deployment of the Joint Tactical Ground Station (JTAGS) occurs during the near-term. The THAAD UOES, scheduled for FY 96 activation, will not mature sufficiently in the near-term; thus, it will not be classified as deployable until a later date.

Early Deployment Operations. In early entry operations, the availability of cueing data and refined tactics will provide Avenger with an improved capability against UAVs and cruise missiles. Given suitable emplacement, GBS can cue the Avengers which may be positioned up to 10 km forward of the protected asset. This positioning permits detection and engagement of UAVs and cruise missiles before they can locate or attack our defended assets. However, helicopters could still "pop up" from hover positions and engage defended assets. JTAGS will provide any two theaters a strategically and tactically deployable capability to receive and process Defense Support Program (DSP) sensor information on TBM launches and impact points.

During expansion operations Avenger, BSFV, MANPADS teams, HAWK and PATRIOT have limited capabilities against threat platforms. Although sufficient quantities of Avengers, BSFVs, and MANPADS teams will be available for force protection, there will not be enough GBS/FAAD C2 systems to meet all mission demands. The PATRIOT, with its small defended area footprint, cannot assure destruction or neutralization of TBM warheads, and it may not detect and engage adequate numbers of low radar cross section targets, such as cruise missiles. As stated earlier, PATRIOT and HAWK systems have mobility limitations.

Decisive Operations. During decisive operations, maneuver forces will be targeted by UAVs, RW aircraft, TBMs and cruise missiles, especially the latter two, if forces are concentrated. Avenger systems can successfully counter both reconnaissance and weapon bearing UAVs and running-type rotary wing platforms. However, HOKUM-type aircraft, capable of firing from stand-off hovering positions, will enjoy considerable advantages over Avenger in one-on-one engagements. The BSFV Stinger teams cannot adequately defend the force against rotary wing threats and will be exposed to direct and indirect fires in the forward area. TBMs and cruise missiles will pose as an increasingly greater threat as the maneuver force moves out from under PATRIOT and HAWK's protective umbrella. The near-term deficiencies of the ADA force do not permit it to counter a technologically improved threat; thus, friendly operations may be jeopardized and will undoubtedly result in numerous casualties.

Strategic Realm. Ongoing National Missile Defense (NMD) efforts concentrate solely on technological improvements and new ideas, but they yield no system improvements or fieldings to counter strategic threats to the United States. The near-term deficiencies become the priorities for mid-term resolutions. The latter are shown in Figure I-9.

MID-TERM PRIORITIES

- Enhance Tactical Missile Defense capability
- Continue C4I integration with the supported force
- Deny UAV observation of the maneuver force
- Increase lethality against mass destruction warheads
- Defend maneuver forces against rotary wing, cruise missile, short range ballistic missiles, and other low radar cross section threats
- Increase weapon and friendly air effectiveness via positive identification
- Increase early warning of TBM launches

Figure I-6

Mid-Term Assessment (FY 97-FY 00). During the latter years of the POM, additional units will receive Block I Stinger upgrades; additional GBS and FAAD C2 systems will be fielded; PATRIOT PAC-3 capability is fielded; and the THAAD User Operated Evaluation System (UOES) unit will become operationally deployable. RDTE continues on Stinger Block II improvements and modifications to the BSFV (enabling the MANPADS team to fire while under armored protection). If funding is or becomes available, BSFV-E could be fielded to Force Package 1 units in FY 97-98 timeframe.

Early Deployment Operations. During the latter years of the POM, the entire contingency force and some of Force Package 2 will receive the GBS and FAAD C2 systems, further expanding the availability of quality cueing data to all FAAD units. Because the Block II upgrades to the Stinger missile will not be fielded during this period, the entire FAAD suite of weapons will remain constrained by the limitations of the Block I version. PATRIOT PAC-3 will substantially improve protection of entry area choke points and assembly areas against TBMs and cruise missiles. An operationally deployable THAAD UOES unit (to be deployed in emergency situations only) will have the technical capability to neutralize the mass casualty warhead on a long-range TBM, a target outside of the PAC-3 target set. The THAAD UOES is expected to be deployed in the vicinity of entry area or near geopolitical assets. Although the defended area footprint of the PATRIOT system is now larger, the system itself continues to have mobility limitations restricting protection of forces during expansion operations.

Decisive Operations. Previous limitations identified will remain for FAAD systems in the near-term. However, fielding of BSFV-E during this period could significantly improve ADA coverage of maneuver forces. TMD protection improves for fixed locations with the addition of THAAD and the PATRIOT PAC-3. However, as

maneuver forces move away from these ADA systems, the less protected they will be from TBM and cruise missile attacks. Moreover, if the speed of maneuver force is greater than the speed of the PATRIOT and THAAD UOES units—a great likelihood—they again fall prey to less protection.

Strategic Realm. Ongoing National Missile Defense (NMD) efforts continue to concentrate solely on technological improvements and new ideas, but they yield no system fieldings to counter any strategic threats to the United States.

The mid-term deficiencies become the priorities for far-term resolution. These are identified in Figure I-10.

FAR-TERM PRIORITIES

- **Robust TMD in support of force protection operations**
- **Enhance defenses of the maneuver force against stand-off platforms with increased lethality and smaller signatures**
- **Increase lethality against mass destruction warheads**
- **Real time data distribution/fused intelligence**
- **Enhance positive identification and situational awareness**
- **Defense of the United States**

Figure I-10

Far-Term Assessment (FY 01-FY 09). During this period the projected ADA force will have a robust capability against TBM threats and will maintain matching capabilities against expected cruise missile technology (assuming the currently programmed BMDO funding for THAAD, Corps SAM and PATRIOT PAC-3 remain intact). Deficiencies in the Stinger based FAAD systems will be corrected with the fielding of the Block II upgrades (better engagement capability against helicopters in clutter as a result of the focal plane array seeker, software upgrades, advanced IRCM, and improved capabilities against UAVs and cruise missiles). However, funding is only adequate to upgrade sufficient missiles for the Contingency Force. Follow-on forces continue to be susceptible to stand-off, hovering helicopters/UAVs. Fire Control and sensor upgrades to the BSFV will allow gunners to fire the Stinger missile while under armored protection; however, procurement funding is only programmed for FP-1 units. FAAD C2 and GBS fielding is now complete; still, the units that do not receive these systems will remain subject to threats.

The notable additions to the ADA force during this period will be Corps SAM (assuming the currently programmed BMDO funding lines remain intact) and the objective THAAD system, with its supporting Ground-Based Radar (GBR). Corps SAM has enhanced mobility capability and provides low to medium altitude, medium range defense against TBMs, cruise missiles, UAVs, and fixed wing/rotary wing aircraft, all of which primarily target corps forces and assets. The objective THAAD/GBR system will

provide a wide area, upper tier defensive capability against ballistic missiles and complement the lower-tier coverage provided by PATRIOT PAC-3.

Early Deployment Operations. In entry operations, Corps SAM will provide some capability against each threat to the entry force. With the arrival of THAAD/GBR elements and PAC-3 fire units, THAAD/Corps SAM and THAAD/PAC-3 defensive enclaves will be established around key military and geopolitical areas. However, threat UAVs, with reduced platform signatures, and rotary wing aircraft, with enhanced night vision and fire control, could continue to create problems for the entry force. Avenger and Corps SAM have some capability against the UAV by virtue of their tactical positioning and C2 links, but only Corps SAM can effectively counter the hovering rotary wing threat at its stand-off range.

During expansion operations, Corps SAM's mobility facilitates rapid march order, deployment by either air or ground means, and rapid emplacement time. Properly positioned Corps SAM assets will deny RSTA UAV observation and engage TBM/cruise missiles targeted against the corps area. Avengers supported by GBS acquisition will limit UAV observation when deployed and properly integrated. PAC-3 and THAAD/GBR provide capable protection against TBMs in the entry areas.

Decisive Operations. In decisive operations, PAC-3/THAAD enclaves can counter the TBM with a mass casualty warhead. Corps SAM and Avenger will provide a viable defense in corps main and rear areas. BSFV and MANPADS teams will move with and provide a layer of protection over the maneuver force. However, HOKUM type rotary wing aircraft, a primary threat to maneuvering forces in the close battle, may be able to operate with little opposition at their stand-off ranges.

Strategic Realm. No systems to resolve the strategic threat deficiency have emerged.

Summary

The ADA force begins the POM years with significant shortcomings, particularly in the Stinger based FAAD units. The Stinger missile shortcomings only begin to be corrected in FY 96. Until the GBS begins arriving in FY 97, FAAD units have a very limited acquisition capability. Until the fielding of FAAD C2 technology, the capability of these units to use early warning data is extremely limited. Only upon fielding of the products of many years of RDTE effort, will FAAD units once again become a viable deterrent to enemy aerial systems that threaten our ability to move freely across the battlefield.

Improvements to the PATRIOT system and the fielding of the THAAD and Corps SAM systems will create a near leakproof defense in all phases of the operation, from early deployment to decisive close combat.

The deterrent effect of these formidable defenses cannot be understated, for if the enemy clearly understands that their aerial attacks will not achieve their intended objectives, they will perhaps take a second look at commencing hostilities in the first place.

A summation of ADA capabilities against expected threats is shown in Figure I-11.

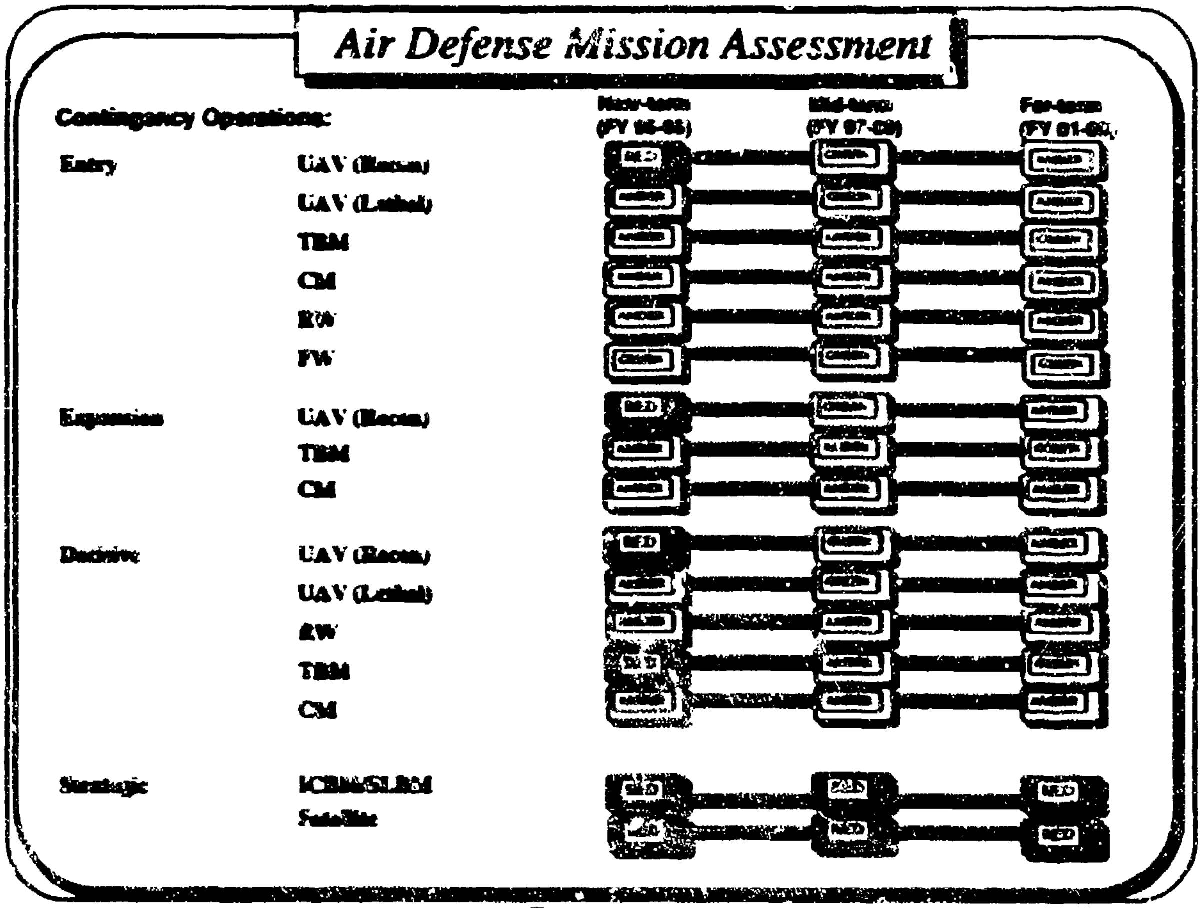


Figure I-11

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

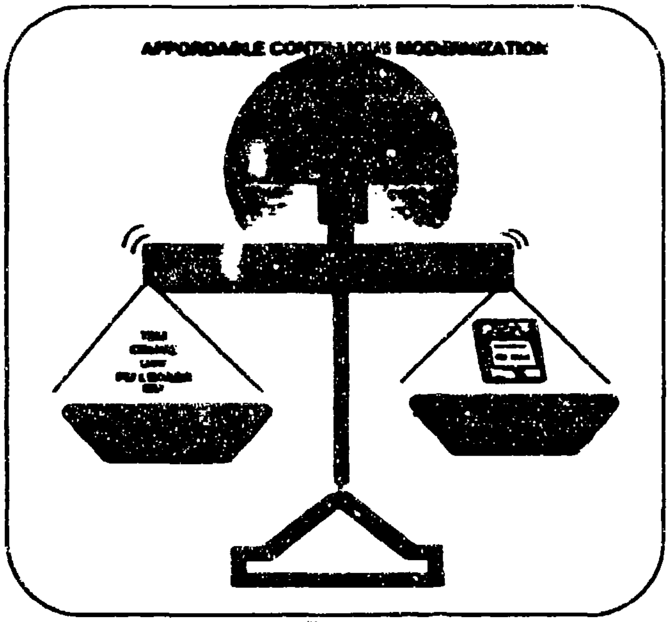


Figure 1-12

Introduction

This section outlines the Research, Development, and Acquisition (RDA) strategy required to implement the prioritized air defense capabilities established in Section 3, Assessment of Current Force. To achieve the operational capabilities required, we follow a balanced material development and acquisition strategy. The Air Defense modernization strategy is based upon having a system either in production, being upgraded via technology insertion, or having a replacement system in development. Eight modernization principles, each aligned with future warfighting requirements, threat developments, and fiscal realities, focus our RDA program. The eight modernization principles are:

- Field inside opponent's modernization cycle;
- Priority to first to fight;
- Modernize by force packages;
- Design for future modernization;
- No risk to lethality or survivability;

- Minimize training and readiness turbulence;
- Replace systems within their useful age (25 years); and
- Leverage leap ahead technologies.

Our ADA acquisition strategy in this era of austere budgets and reduced force structure requires that we very selectively modernize our forces by upgrading in the near-term, continue doing research on high payoff technologies, and initiate new starts that provide leap ahead capabilities designed to overmatch the future threat. The newly created Air Defense Lab at Ft. Bliss will greatly facilitate the refinement of requirements within the Enhanced Concept Based Requirements System (ECBRS), and permit the examination of emerging doctrine, training, leader development, organizations, and materiel developments (including new technologies).

Air Defense Funding. Funding for ADA modernization comes from two sources: the Army POM and the BMDO POM. The Army POM provides funding for Stinger, BSFV, Avenger, FAAD C2, GBS, LSDIS, JTAGS, and some PATRIOT. The BMDO POM provides funding for THAAD, TMD-GBR, PATRIOT PAC-3, Corps SAM and NMD. Figure I-13 depicts the level of funding provided by both the Army and BMDO POMs.

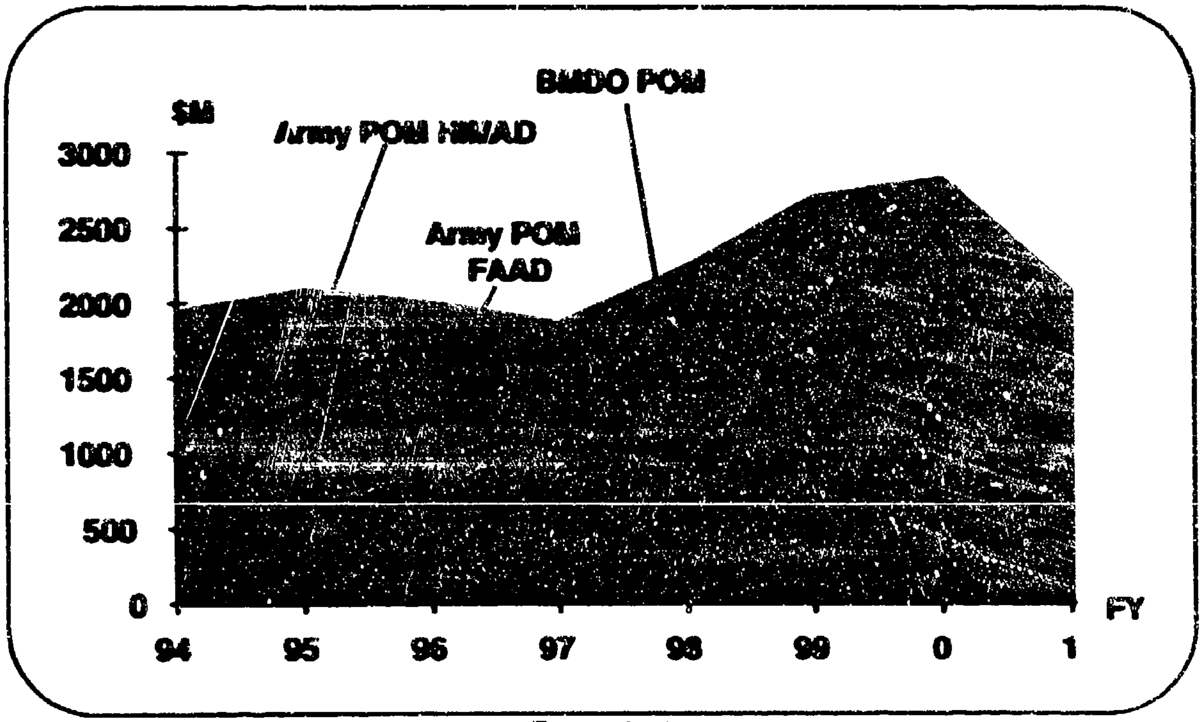


Figure I-13

What The POM Buys

Stinger: The entire FAAD compliment of weapons systems is Stinger based. Additionally, the KIOWA Warrior and USMC Light Armored Vehicle-Air Defense (LAV-AD) are adapted to use the Stinger missile. Therefore, sustainment and modernization of the Stinger missile remains a critical issue. RDTE funding completes the development of the Stinger Block I missile, continues the development of software for the Reprogrammable Microprocessor to ensure that it remains current with the threat, and begins (but does not complete during the POM years) the Block II effort.

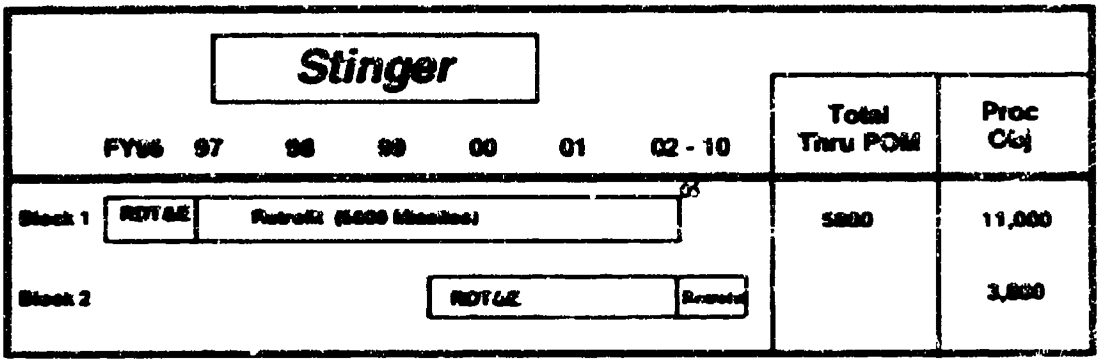
Block I Stinger improvements provide the following:

- Adds a roll rate sensor, enhanced software, and replaces the existing battery;
- Improves lethality and accuracy against countermeasures and low observables (UAVs and cruise missiles), and enhances night engagements;
- Eliminates the super elevation requirement in air to air engagements allowing engagements at lower altitudes and improves survivability of the launch platform; and
- Extends the shelf life of the existing missile inventory by 10 years.

Block II improvements eliminate the remaining shortcomings of the Stinger system while using existing launchers and integration means, while maintaining the Stinger's existing size and weight. Attributes include:

- An advanced infrared Focal Plane Array Seeker
- Improved ability to acquire rotary wing targets in clutter
- Improved acquisition range against UAVs/RPVs/cruise missiles;
- Full night capability;
- Off-axis engagements to support air to air mission capabilities; and
- Advanced infrared countermeasure capability.

Procurement funding is only adequate to retrofit 5800 missiles with Block I upgrades during the POM years. This represents 52% of the ADA and aviation warfighting requirements. All missiles not modified will exceed their shelf life by FY 05. Funding levels for Block II Stinger, in the POM and EPP years, support a minimally funded, high risk development program, and do not include the platform integration costs required to realize the full benefits of the improved missile.



Avenger: Previous year budget reductions decreased Avenger procurement; the Army will only procure and field 674 Avenger systems. Thus, seven ARNG Chaparral battalions will not transition to the Avenger weapon system. Two product improvements have been funded: the integration of a M3P machine gun on each fire unit, and retrofit of each Avenger turret on a heavy HMMWV. Additionally, 336 systems will receive environmental control units/prime power units (ECU/PPU). This unit corrects a known environmental hazard to the gunner when operating in hot climates.

No other system modifications are funded in the POM. Additional funding could provide the following: the remaining 338 Avenger fire units would receive the ECU/PPU improvement; integration developments for FAAD C2 via a Simplified Handheld Terminal Unit (SHTU) to achieve a Slew-to-Cue capability; an Integrated Weapon System Display (IWSD); a Remote Control Unit upgrade; the Integrated Logistic Support modification which makes safety and convenience improvements; and, an Advanced Electro-Optical Sensor Suite with Improved Fire Control, all of which could be integrated into the BSFV for commonality.

This advanced sensor suite improvement would:

- Eliminate the manual boresighting requirement;
- Improve target acquisition capabilities;
- Improve range finder performance;
- Allow optical target identification;
- Provide protection of the optical surfaces from fragmentation, blast and erosion;
- Allow full EMRCVEJIP performance;
- Provide target image handoff to an imaging seeker;

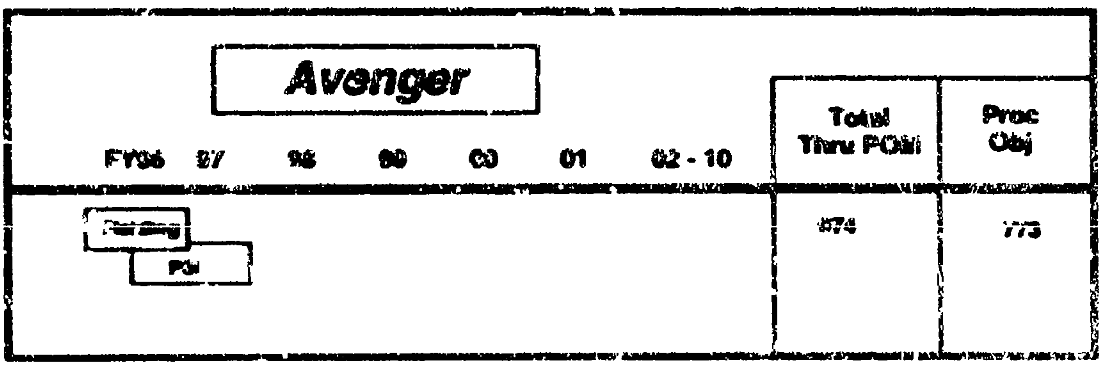
- Provide a replacement for obsolete laser range finder and FLIR components in the basic Avenger; and
- Increase system reliability by combining LRUs and updating technology.

The fire control upgrades would:

- Integrate advanced sensors with other sensors;
- Improve man-machine interface of fire control system;
- Provide replacement for obsolete fire control components in basic Avenger;
- Increase system reliability by combining LRUs and updating technology;
- Allow full EMRO/EMP performance;
- Maintain synchronization with C4I;
- Automatically uptell or crosstell target reports to other units; and
- Upload additional Stinger RMP target specified software.

The Integrated Weapon System Display (IWSD), would:

- Enhance Avenger's engagement capability; and
- Provide increased battlefield horizontal integration and digitization.

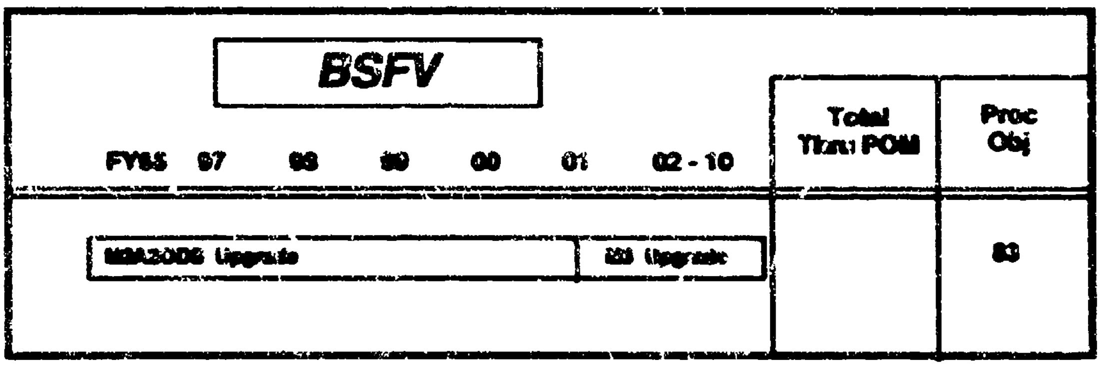


Chaparral. Chaparral is a mature system with several technical modifications. It has been phased out of the Active Army (replaced by Avenger at Corps level) and remains in the ARNG. The original Avenger procurement plan called for all Chaparral units to be converted to Avenger, but budget reductions reduced the Avenger buy to 674 fire units—a quantity sufficient only for the Active Army and to convert one ARNG Chaparral

unit to Avenger. No further modifications to the Chaparral system are budgeted in the POM.

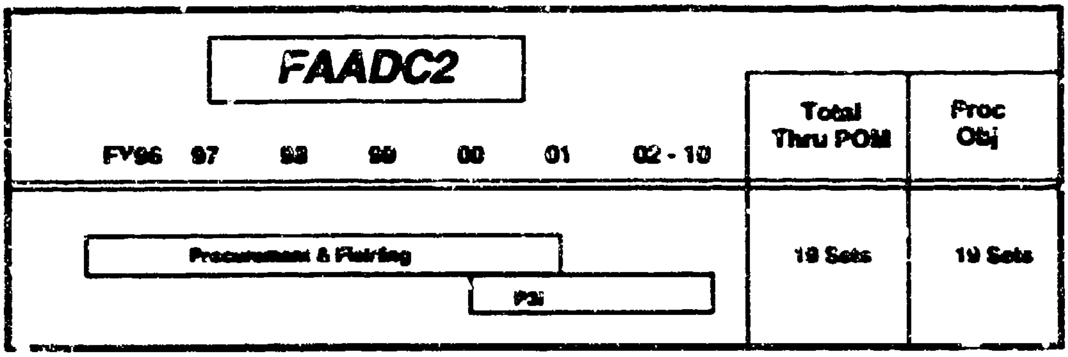
Bradley Stinger Fighting Vehicle (BSFV): The BSFV consists of a MANPADS team in a Bradley Fighting Vehicle. The Stinger missile is integrated with the BFV's organic weapons, and the MANPADS team is protected in a BFV and is able to keep up with maneuvering forces. However, a shortcoming remains--to engage a threat, the BSFV must stop to allow the MANPADS team to dismount and fire the Stinger missile. This places the BSFV and the MANPADS team at risk to direct and indirect fire. It is the Army's intent to convert BSFVs to the M2A2ODS version of the BFV beginning 1Q96. The M2A2ODS has a laser range finder, GPS/POS NAV, combat ID capability, and a driver thermal viewer. Beginning 1Q00, the M2A2ODS is replaced with the M3 version of the BFV. This provides the second generation FLIR, C2 software, and CDR independent FLIR.

EPP RDTE funding focuses on accomplishing initial survivability upgrades such as minor fire control upgrades and replacing the TOW with a Standard Vehicle Mounted Launcher (SVML). The actual procurement and fielding of these upgrades will be accomplished in the EPP, as will future RDTE on fire control and sensor upgrades. EPP procurement funding is only sufficient to modify 83 systems for FP 1.



FAAD C2: The FAAD C2 system began its fielding in FY 93 and has proven invaluable. It automatically disseminates air tracks and C2 information to FAAD weapons, provides FAAD battalion digital horizontal integration of force operations, interfaces with Joint sensors, and provides situational awareness of the third dimension, to the Division TOC. The system consists of nondevelopmental computer displays and printers common to Army Battle Command System (ABCS), and functions as the ADA node of ABCS.

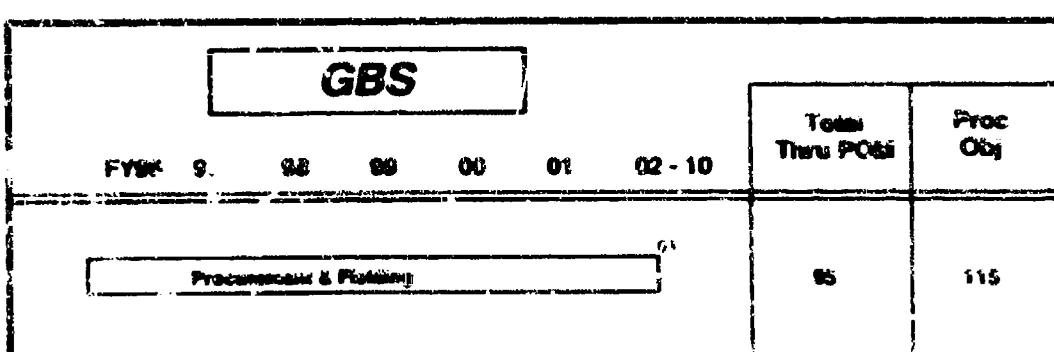
POM funding is sufficient to procure and field a total of 19 unit sets and includes the funding for 20 JTIDS radios (two per Divisional FAAD Bn). Only two ARNG units will receive FAAD C2. Funding has been programmed for limited Preplanned Product Improvement (P3I) growth of the system during the POM and the EPP.



Light and Special Division Interim Sensor (LSDIS): Designed as an interim fix to replace the soldier with binoculars approach for early warning in our light and special division ADA battalions and Contingency Corps Avenger units, this sensor provides ADA units with short-range, all weather, fixed and rotary wing aircraft alerting and direction orientation. LSDIS is a two dimensional sensor and thus cannot provide altitude/elevation data. The system is manportable, air-droppable, and HMMWV mounted. It has a 20 Km range and conducts continuous volume surveillance of aircraft. All procurement and fielding of this system is to be completed in FY 95. It will be replaced by the GBS, the objective sensor system in the long-term.

FAAD Ground-Based Sensor (GBS): The first pre-production models of the GBS were fielded to 24MX in FY 94. The FUE of the GBS in the HMMWV configuration is scheduled for FY 97 and fielding will continue into the EPP. Tied in with FAAD C2I, the GBS will alert and cue all FAAD weapon systems to hostile and unknown aircraft, UAVs and cruise missiles, will help protect friendly aircraft from fratricide, and will provide air situation data to C2 centers. The GBS is the only sensor on the future battlefield capable of detecting low radar cross section reconnaissance and lethal UAVs and cruise missiles. The system has built-in electromagnetic countermeasures (ECM) and is anti-radiation missile resistant.

POM funding is sufficient to procure and field 95 systems, and the EPP contains funding for approximately 20 more. This fields two ARNG battalions and fills all AC units.



Joint Tactical Ground Station (JTAGS): The JTAGS provides a strategic and in-theater tactical deployability to receive and process Defense Support Program (DSP) sensor information on TBMs and other events of interest. Present strategic warning systems do not provide timely, accurate information to theater forces, nor do they meet the requirement for a deployable in theater asset. No other in theater capability exists. POM funding procures a total of five JTAGS. This provides adequate capability for two contingency theaters of operations. There are no P3I funds programmed.

PATRIOT: The PATRIOT is an advanced surface to air guided missile system, with a high single shot kill probability, capable of operating in the presence of ECM, and able to conduct multiple simultaneous engagements against high performance air breathing targets and ballistic missiles. The system has grown from its initial fielding configuration designed to counter air-breathing aircraft, through changes made during ODS to counter the SCUD threat, to the PAC-3 version to be fielded during the POM years. The majority of POM funding for the PATRIOT system comes from BMDO. For further discussion of the TMD capabilities being addressed by BMDO RDTE and procurement funding, see Annex J, Theater Missile Defense.

The Army POM primarily includes funds for support costs and the planned system P3I Growth Program that will add hardware enhancements and improvements to the system. For example:

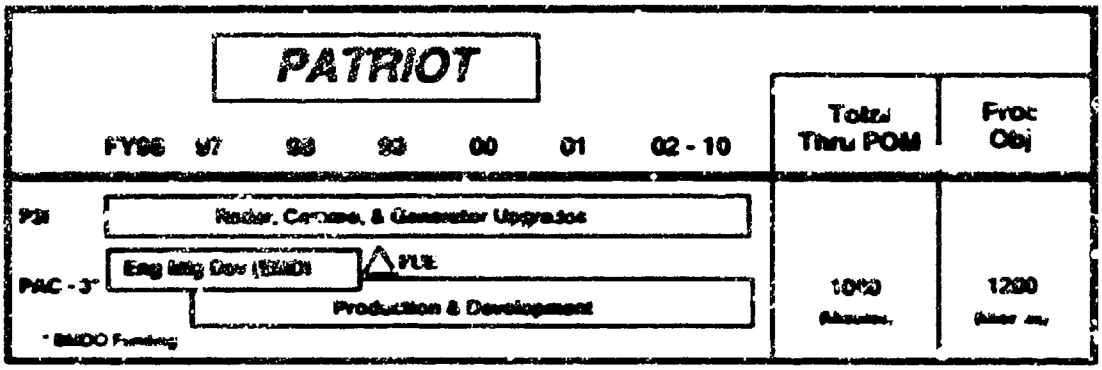
- Block II upgrades that improve the radar set, engagement control station, information and coordination central, launching station, battalion maintenance equipment/group, communications relay group, and the ISE/PFASC shop sets. These have been incorporated in ECPS's.

- Weapon Control Computer (WCC) upgrades that increase by four times the speed and memory size of the current WCC via a very high speed integrated circuit. Peripheral devices, which permit the full use of the expanded WCC, will be improved by replacing the data Recovery Storage Unit and the Mass Storage Unit with an optical disk.

- Classification, Discrimination, and Identification (CDI) Phase I efforts provide improvements to the identification process and enhance air defense effectiveness by reducing the potential for fratricide and offering better management of missile expenditures. Phase II and Phase III CDI upgrades are unfunded.

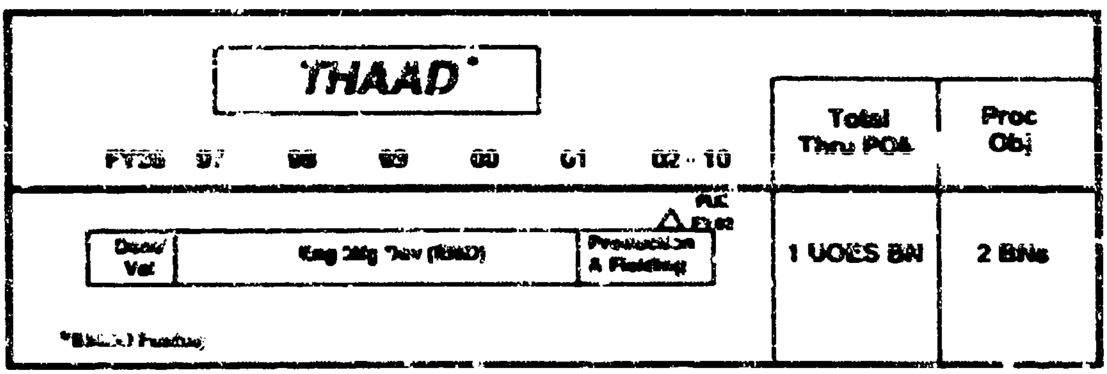
- Communication Enhancements Phase II focuses on intrabattalion communications and improved interoperability at the fire unit level for contingency operations. It provides an integrated assemblage of the Routing Logic Radio Interface Unit Upgrade to add interfaces for told-in intelligence source; Common Air Defense Communications Interface (CADCI) to provide automated switching within the battalion and fire unit voice and data interface

with the Army Common User System; JTIDS integration to support contingency operations; high speed filters to permit access to long haul data transmission means; and, a fiber optic port to provide a local area network interface with the battery command post. In addition, Band IV UHF radios will replace existing Band III models to meet regulatory and international agreements requirements.

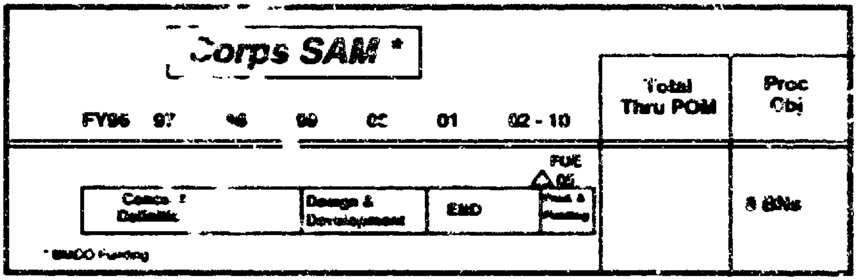


HAWK: The HAWK missile system is no longer in the Active Component and is currently in the ARNG. The system came into the Army in 1959 and has had numerous modifications. Currently, the HAWK system complements the PATRIOT system at Corps level by providing 360 degree coverage against targets generally below the altitude being searched by PATRIOT. There are no funds programmed in the Army POM for continued upgrades; HAWK will retain its current configuration into the foreseeable future.

Theater High Altitude Area Defense (THAAD): This system has received very strong support within OSD and from Congress. It is designed to kill TBMs at long ranges and high altitudes and to operate in an enclave with PATRIOT. Its long-range surveillance and intercept capability protects widely dispersed assets and population centers against TBM attacks. For a detailed discussion of this system and its associated BMDO POM funding, see Annex J, Theater Missile Defense



Corps Surface-to-Air Missile System (Corps SAM): This system, intended to replace HAWK and PATRIOT at Corps level, is much more strategically deployable and tactically mobile than its predecessors. It provides low to medium altitude air defense for Corps and reinforcing divisions in all conflict areas. For a detailed discussion of this system and its associated BMDO POM funding, see Annex J, Theater Missile Defense.



National Missile Defense: This program has been relegated to technical development only. For a detailed discussion of this system and its associated BMDO POM funding, see Annex U, National Missile Defense.

Digitized Battlefield: ADA leads the way in the Army in digitizing the battlefield. By integrating FAAD C2 systems, sensors, and weapons, ADA optimizes the collective capabilities of allocated resources. Within the distributed architecture design, FAAD C2 integrates external sensor and intelligence data and other Army Tactical Command and Control System (ATCCS) information on a near real time basis; filters, accurately correlates, and fuses all relevant information received; and, allows distribution of pertinent information to all designated battlefield users and ADA weapons (via Combat Net Radios (CNRs) or ADDS). Digitization exists throughout our existing HAWK and PATRIOT units, and is embedded in all THAAD and Corps SAM development efforts. Details about TMD digitization efforts are in Annex J.

Science and Technology Efforts: An aggressive Science and Technology (S&T) program has led to numerous advancements that enhanced the capabilities of many ADA systems. The Army continues to place increasing emphasis on Advanced Technology Demonstrations (ATDs) and Advanced Warfighting Experiments (AWEs) to enable the user to develop more informed requirements and to enable the materiel developer to reduce risk prior to the initiation of full scale system development. Capabilities developed in these ATDs provide a sound baseline on which to build future joint efforts.

Of the ongoing ATDs (to be followed up with AWEs), the air defense mission area benefits from many: Multi-sensor Aided Targeting-Air, Bi-static Radar for Weapons Location, Combined Arms Command and Control, Battlefield Combat Identification, TACAWS, and the Rapid Force Projection Initiative (RFPI) Advanced Concepts Technology Demonstration (ACTD). Additionally, the development of our

ADA systems has been benefited by: initiatives in survivable target acquisition and positive identification; dispersed, distributed C2 and supporting communications; multiple missile guidance modes against the reactive threat; high energy, insensitive propellants; efficient control force generation; mobility, lightweight and increased firepower; hit-to-kill technology; high power microwave and directed energy weapons; new materials and structures for lightweight, low signature vehicles and air-frames; and, a unit-oriented training architecture that fully exploits the material capability.

Programs such as the Electronic Integrated Sensor Suite and Masked Target Kill may provide new search and track capabilities which can be integrated in FAAD's multi-sensors. Improved primary and secondary weapons (hypervelocity, directed energy) may be incorporated to provide dead zone and self-protection coverage.

CINC's TMD Experiment Program: This program, begun in FY 89, provides CINCs a yearly threat based opportunity to develop their tactics, techniques, procedures, and long-term theater architecture requirements for TMD. For a detailed discussion of this and the associated BMDO POM funding, see Annex J, Theater Missile Defense.

Unfunded Requirements: Budget reductions have increased the number of unfunded requirements in the air defense arena. By the end of the POM period, deficiencies in the following areas will still exist: FAAD engagement capabilities, lethality, and survivability; low cost effective defense against cruise missiles and antiradiation missiles; an antisatellite capability; the ability to passively detect and identify targets beyond visual range; and, the ability to protect the U.S. against ICBM/SLBM attack.

SUMMARY

This section focused on how well we are attaining the materiel aspects of existing air defense modernization plans. Numerous unfunded requirements still exist, but this POM goes a long way toward correcting deficiencies that have existed for a period of time. Although it is recognized that materiel improvements alone cannot win a battle, victory in any future conflict will result from a skillful blend of materiel with sound tactics and doctrine, balanced organizations, and well trained soldiers and leaders. There is no more capable ADA force in the entire world. The deterrent effect of such a formidable force should not be lost on any potential adversary.

SECTION 5

TRAINING

Introduction

This section delineates the ADA training concept; its implementation via a comprehensive training strategy, with special emphasis on the ADA Combined Arms Training Strategy (CATS); and, the use of Training Aids, Simulators and Simulations (TADSS). It incorporates the training principles of FM 25-100 and FM 25-101 and the six Army imperatives. Since the soldier is the key to America's victory in war, his/her training is monumentally important to winning decisively with minimal casualties.

Training Concept

The ADA training concept focuses on training the ADA soldier to operate effectively as a member of the combined arms force on the future battlefield. Effectiveness is achieved through progressive and cyclic training to sharpen individual and collective skills.

Training Strategy

The key features of the training strategy are:

- Define and train to Mission Essential Task Lists (METL);
- Emphasize combined arms and joint team training;
- Emphasize simulations in lieu of field exercises;
- Leverage technology in TADSS;
- Continue to use distributed training;
- Provide Reserve Component soldiers and leaders training that is adaptable to their citizen-soldier responsibilities and concurrently, sufficiently challenging to meet the needs of a deployable force; and
- Institutionalize CATS for all ADA systems.

Combined Arms Training Strategy

CATS, the Army's training strategy, provides total training and training resource management. It has been instituted for each ADA system using the TRADOC developed, standard formatted unit training strategy. The format accommodates a

common approach and unique system demands/tasks. This format addresses three major components: soldier training, gunnery training, and maneuver training.

Soldier Training: The soldier training strategy provides guidance to the commander on the conduct and resources of the individual soldier training program. AR 350-1 and the soldier manuals are the basis of the strategy. Training events and resources are: physical training, MOS training, common task training, common military tasks, NBC training, leader development training, self-development tests, maintenance training, and driver training.

Gunnery Program: The gunnery program is designed to develop and test the proficiency of the individual, squad or crew, and unit in gunnery techniques. The gunnery tables provide mandatory qualification standards and training strategies for each weapon system. Tables prepare individuals to perform as members of a squad or crew to accomplish unit missions. Standards are outlined in applicable Mission Training Plans/Soldier Training Publications. The gunnery program consists of three phases: basic gunnery, intermediate gunnery, and advanced gunnery. The basic gunnery tables train individuals to perform as squad members and instill basic gunnery battle management skills necessary to progress to the intermediate gunnery tables. The intermediate gunnery tables train squads/crews to conduct air battle operations. The advanced gunnery tables train the squad/crew to conduct air defense operations in various modes under various conditions.

Maneuver Training: This integrates gunnery, command and control, and maneuver exercises into a battle focused training plan. The maneuver strategy encompasses a 12 month training cycle with an extended semiannual rotation. The strategy has a series of progressive critical gates/standards and a maneuver OPTEMPO rationale for each weapon system.

Training Aids, Devices, Simulators, and Simulations

CATS is implemented in the ADA school and in units using a variety of system and collective unit training aides, devices, simulators, and simulations. The following descriptions capture ongoing/projected TADSS. It should be noted that many projected training devices are currently limited or unfunded programs.

System TADSS: Include the Stinger Tracking Head Trainer, Stinger Field Handling Trainer, Stinger Launch Simulator, Stinger Troop Proficiency Trainer, Moving Target Simulator, Improved Moving Target Simulator, Avenger Captive Flight Simulator, Avenger Force-on-Force Trainer, Avenger Launcher/Sensor Mockup, Avenger Institutional Conduct of Fire Trainer, BSFV Unit Conduct of Fire Trainer, GBS Maintenance Training System, GBS Troop Proficiency Trainer, FAADS C3I Troop Proficiency Trainer, PATRIOT Missile Round Trainer, PATRIOT Guided Missile Trainer Canister, PATRIOT Conduct of Fire Trainer, PATRIOT Organizational Maintenance Trainer, PATRIOT Radar Set March Order and Emplacement Trainer, HAWK Advanced

Training Simulator, HAWK Training Missile, and the HAWK Integral Troop Proficiency Trainer.

Distributive Interactive Simulations (DIS):

Reconfigurable Tactical Operations Simulator (RTOS) is a high fidelity simulator that replicates the engagement functions in the PATRIOT battery/battalion.

Extended Air Defense Simulation (EADSIM) is a medium to high fidelity constructive simulation run on a microcomputer capable of modeling the functionality of numerous systems that interact to provide air defense; these include command and control, sensors, and surface and airborne platforms of all types with their specific munitions.

Extended Air Defense Test Bed is a medium to high fidelity constructive simulation that greatly expands the functions modeled by EADSIM.

Summary

The ADA training strategy encompasses multiple training means to develop, and subsequently hone, soldier, team/crew, and unit air defense skills. ADA School instruction, through on-site classes, correspondence courses, and system training devices provides system knowledge and some team/combined arms skills. The ADA implementation of CATS provides the guidance and means to increase individual and team proficiencies. The ultimate trainer will be the objective DIS network. DIS, with its ADCATT, JANUS, RTOS, and related components, will optimize ADA training in combined arms and joint operations.

This training section covers areas specific to Annex I, Air Defense Artillery. For further information about Army-wide training initiatives and issues, plus explanations of fielding and funding status, consult Annex R, Training.

SECTION 6

CONCLUSION

Air Defense Artillery protects the force and assists in winning the information war. In so doing, ADA enables the maneuver forces to achieve Land Force Dominance. A credible air defense capability is a significant deterrent to those who contemplate an aerial or missile attack on our forces, for if they know their attack will not succeed, they are not likely to attack. The level of force protection ADA can provide, and thus the degree to which it is a significant doterrent to the enemy, is dependent on the level of modemization achieved by the programmed forces plus how well they are trained and led. The aerial and missile threat to our forces is very real and is expected to increase (particularly in the cruise missile, TBM, and UAV arenas). Deficiencies in current and projected ADA forces must be resolved if we hope to continue adequate protection of the force and be perceived as a credible deterrent to acts of aggression. Figure I-14 illustrates how well POM 96-01 funds ADA deficiencies.

POM FY96-01

	DOES:	DOES *NOT:*
Avanger:	•Procure 674 Avengers (100% FP 1/ 30% FP 3 units) •336 ECU/PPU •Hvy HMMWV/ M3P MG Upgrade	• Fund 338 ECU/PPU • Modemize All ARNG Bns (7 total) • Fund Future P3I Development
Stinger:	• Fund Block I Development and Partial Retrofit Fielding (52% of FP 1)	• Fund Retrofit of all FP1 Requirements (11,000)
BSFV:	• Block II Development (RDTE) • Conversion to M2A2 ODS and M3 version	• Fund SVLM Integration
FAADC2/GBS:	• Fields 100% FP 1/2 and 40% FP3 units	• Procure remaining ARNG units in FP3/FP4
PATRIOT:	• Block II, CDI, Communication Upgrades and Generator procurement • PAC-3 Development/ Fielding	• Fund Automated Battalion Tactical Operations Center (BTOC) and Battery Command Post
THAAD:	• Initial RDTE and UOES Bn	• Common Equipment for UOES
Corps SAM:	• Allow Project Definition/ Validation Phase to Begin	• Fund Remaining Definition/ Validation Phase and Design Development
JTAGS:	• 5 systems	• No P3 I

Figure I-14

While continued progress (in our capability to counter TBMs) through the far term is expected, four serious deficiencies remain, even if currently funded programs are fully exercised:

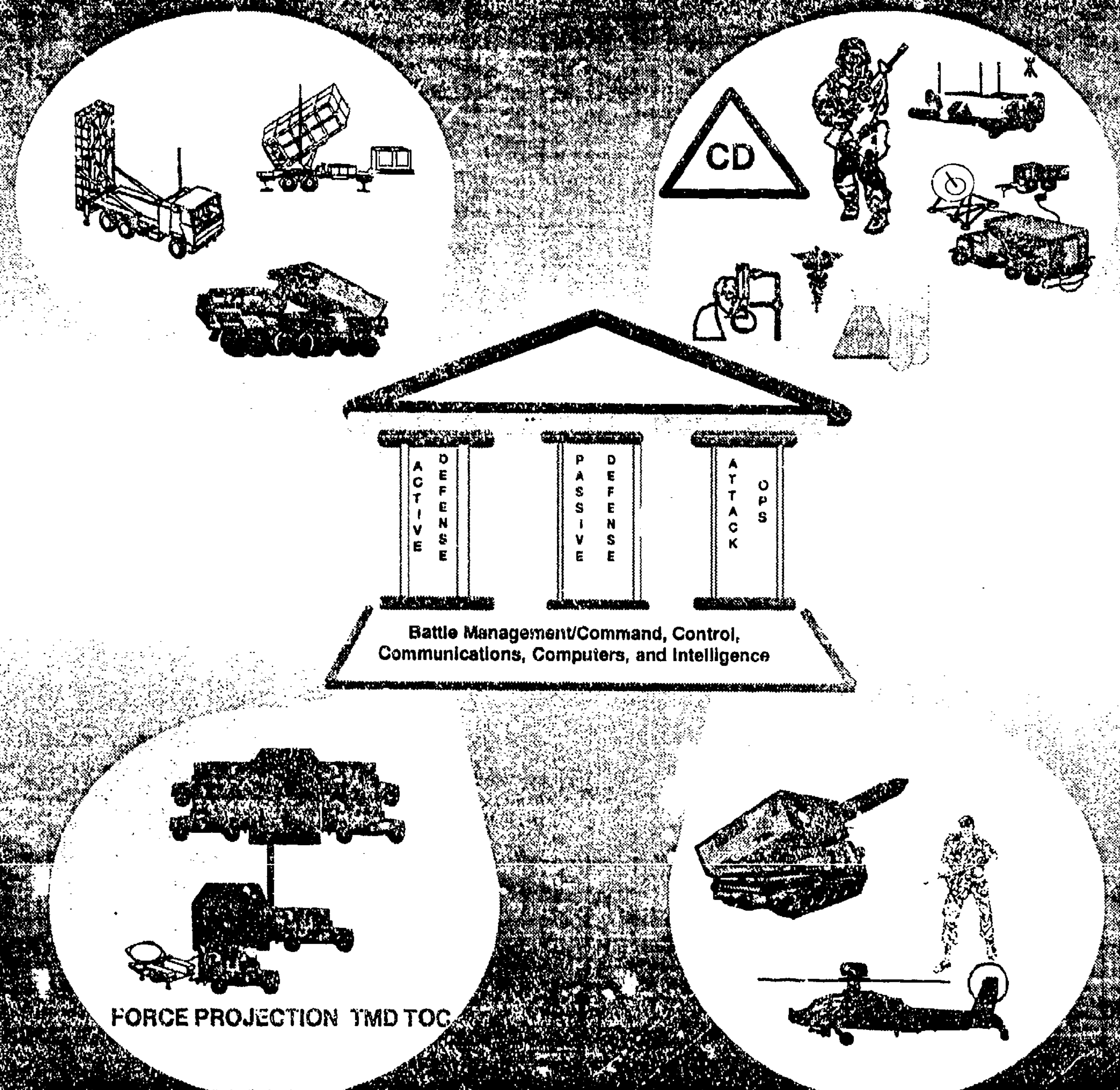
- No capability to defeat ICBM/SLBM/Satellites;
- Limited inventory of missiles to defeat the low-altitude air threat;
- No capability to defeat low-altitude stand-off helicopter/UAV; and
- Inability to field all FAAD units with appropriate FAAD C4I systems and sufficient ability to shoot while protected, thus placing them at significant risk on the battlefield of the future.

Summary

Currently planned programs--PATRIOT PAC-3, THAAD, Corps SAM--provide a robust capability against tactical ballistic missiles. Assuming the Air Force can deal with the manned fixed wing threat, the greatest opportunities for exploitation by potential enemies lie in attack helicopters, UAVs, ballistic missiles, and cruise missiles. If we are to deny a potential enemy a preferred tactical attack option, or method, we must closely examine the sufficiency of programs against these three threats. As these capabilities evolve, the concurrent exploitation of low radar cross section technology further stresses our friendly air defense systems. The most critical tactical deficiency not remedied in the long term, given current programs, is a weapon system which can meet the earlier stated requirements for a survivable weapon platform that can defeat all low-altitude air threats to close combat forces and maintain pace with the maneuver forces. On the strategic level, the cost versus risk of a National Missile Defense and/or an antisatellite program remains a national level decision. Continued emphasis to advance technology and reduce lead time, coupled with the commitment to get the most from the decreasing defense budget, is imperative.

ANNEX J

THEATER MISSILE DEFENSE



Protect US and Allied Forces and Critical Theater Assets by Neutralizing, Disrupting and Destroying Enemy Tactical Ballistic Missile, Cruise Missile and UAV Capabilities

ANNEX J

THEATER MISSILE DEFENSE

SECTION 1

INTRODUCTION

The U.S. National Military Strategy calls upon the military to deter aggression and safeguard our national interests through the use of military forces capable of projecting power rapidly and effectively from bases in and outside the United States. U.S. military forces may be deployed for a variety of reasons: two predominant reasons are to conduct Operations Other Than War (OOTW) or to participate in a major regional conflict. Moreover, the military will usually operate as a joint force, may be part of a multinational force, and will nearly always team with nonmilitary instruments of national power, such as elements of Departments of State and Justice.

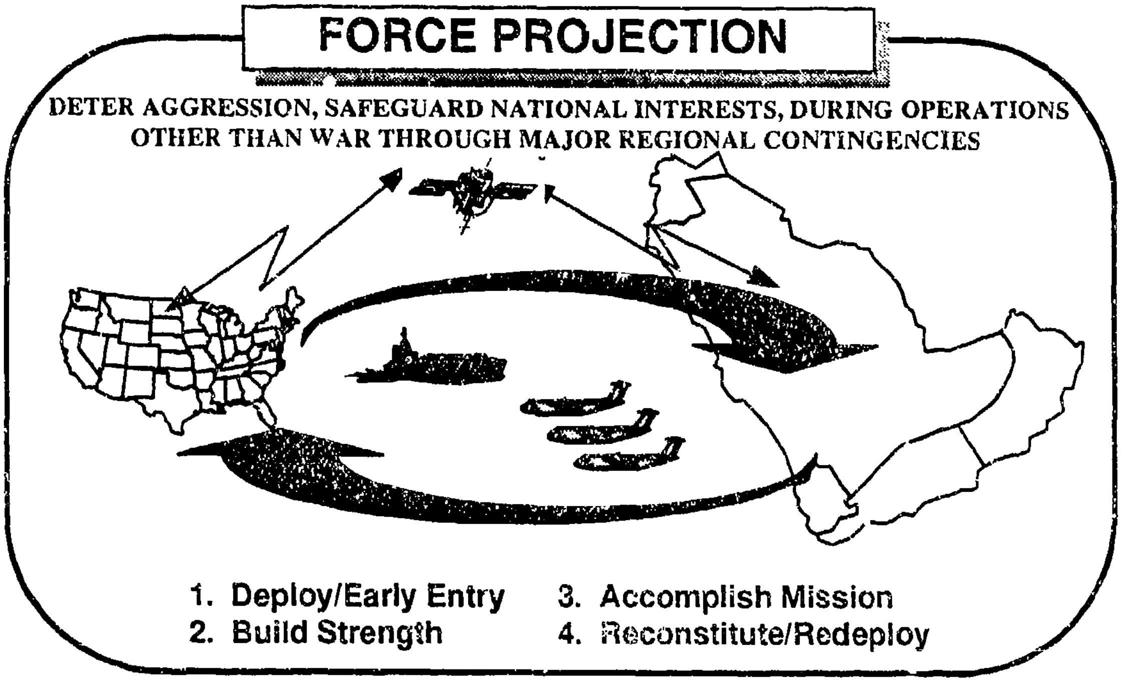


Figure J-1

The Army's modernization vision is to field a 21st Century power projection force capable of Land Force Dominance under any condition. Land Force Dominance is a key element in a warfighting CINC's capability to implement the National Military Strategy, because dominant land forces allow him to accomplish national objectives quickly. effectively, and with minimum casualties.

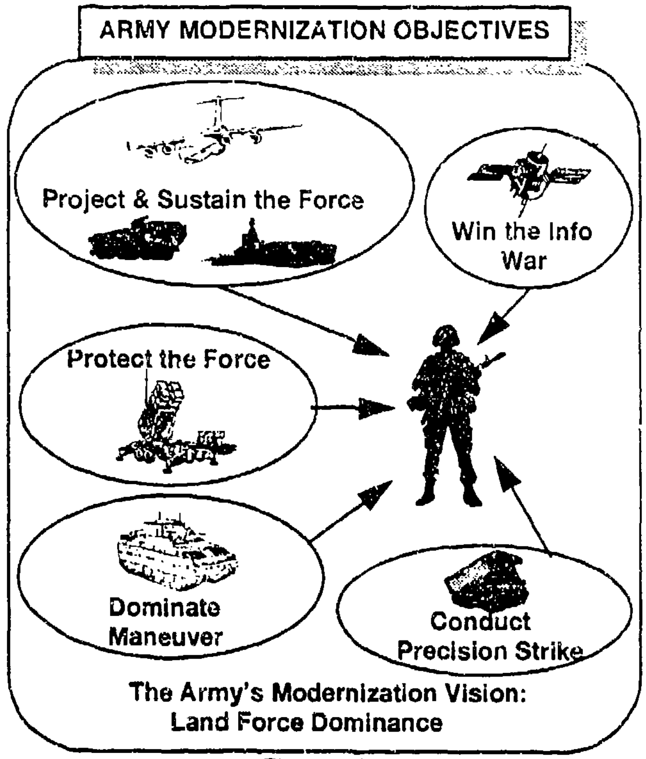


Figure J-2

The Army will achieve Land Force Dominance by accomplishing its five modernization objectives:

- Project and Sustain the Force;
- Protect the Force;
- Win the Information War;
- Conduct Precision Strike; and
- Dominate the Maneuver Battle.

WHY THEATER MISSILE THREAT IS INCREASING

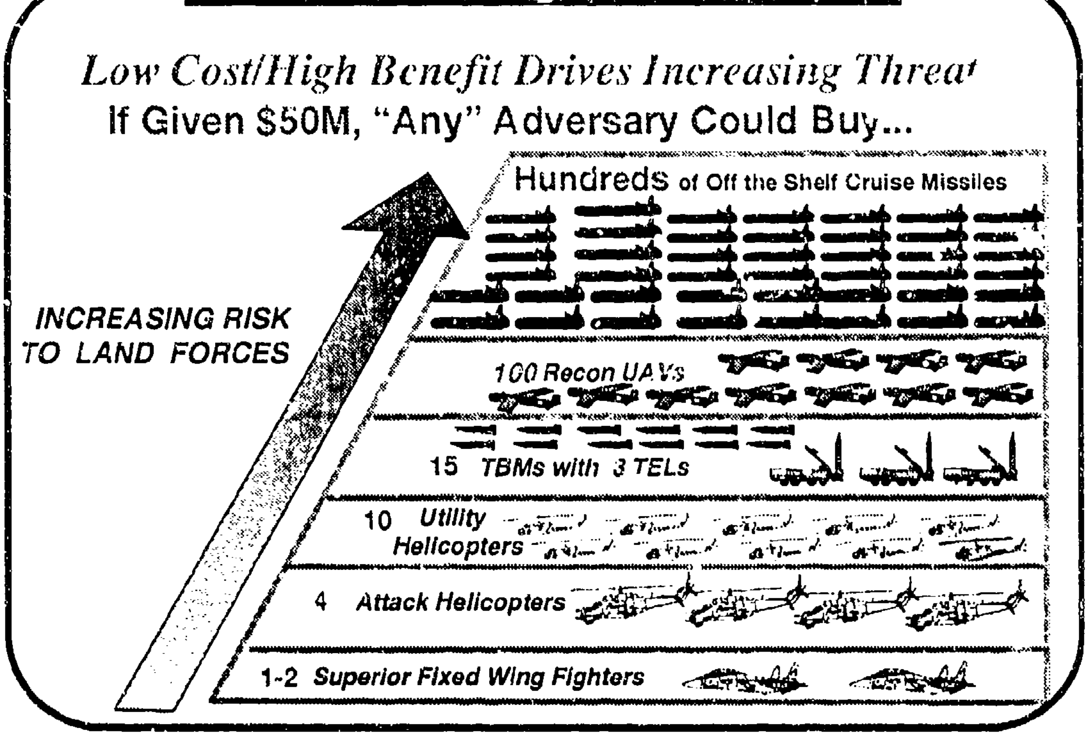


Figure J-3

Theater missiles--defined as ballistic missiles, cruise missiles, and air to surface missiles whose targets are within a given theater--plus unmanned aerial vehicles (UAVs), present grave and rapidly expanding threats to CINC's capability to implement the National Military Strategy. Theater missiles and UAVs can be relatively low technology, relatively inexpensive, and are capable of delivering nuclear, chemical, or biological weapons of mass destruction on military, civilian, and cultural targets. Strikes on the latter category of targets award the use of theater missiles a much greater political and diplomatic reward than warranted by their purely military effectiveness. Thus, these are attractive weapons for terrorists and rogue political leaders. Equally, these weapons are a threat to deployed U.S. forces during both regional contingency combat operations, and major Operations Other Than War; in both, they could be within striking distance of hostile forces armed with theater missiles.

UAVs represent an additional significant threat because they provide hostile forces an effective, inexpensive, low risk method of gathering the near real time information needed to target U.S. and multinational forces.

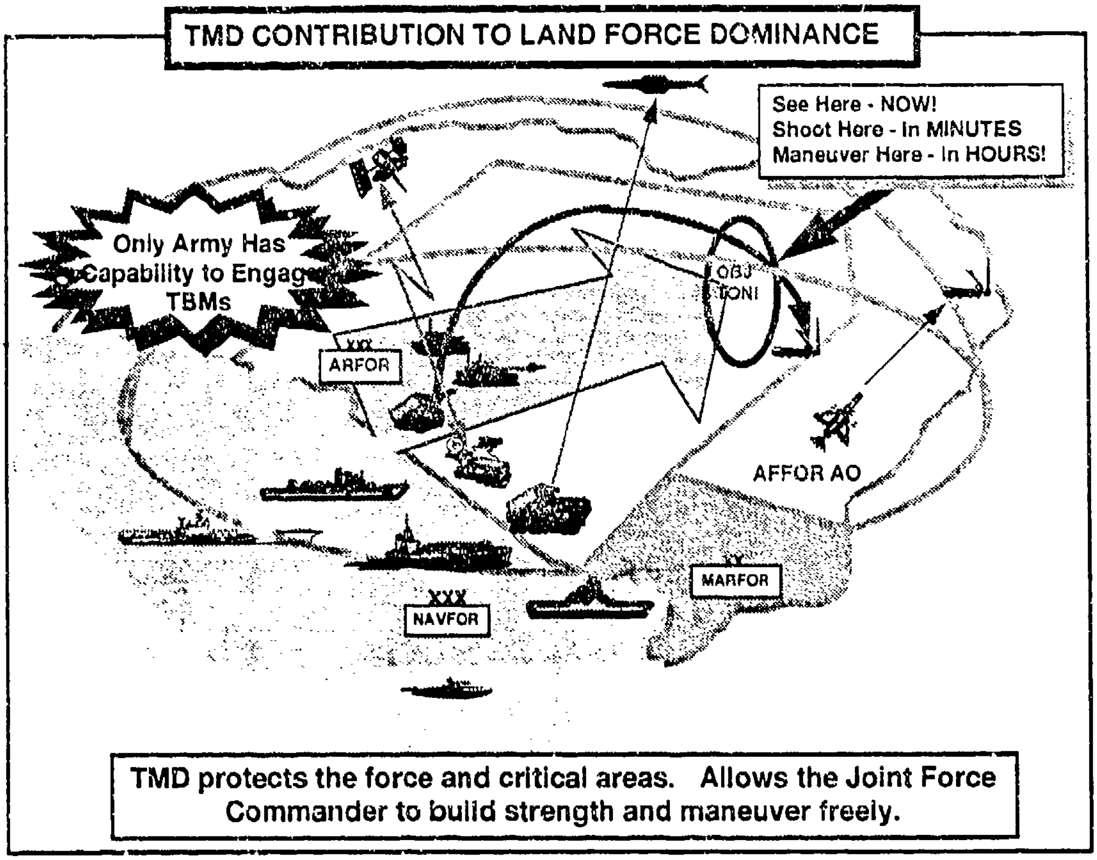


Figure J-4

The Joint Pub 3-01.5 Doctrine for Joint Theater Missile Defense (TMD) March, 1994, declares that TMD is inherently a joint operation. The Army is a key participant in TMD. This annex details, and provides the rationale for, the Army's TMD modernization program; it is developing and improving the Army's capability to protect U.S. and multinational forces, plus areas of vital U.S. interest from hostile theater missiles and UAVs.

TMD is an extraordinarily difficult and complex task. It requires the commitment of Service, joint, and national intelligence resources and capabilities; automated, redundant, and interoperable C4I systems; precision deep attack capabilities; active defense systems; and passive defensive measures. The Army is developing a capability that complements and interoperates with those of its sister Services to provide the Joint Force Commander a TMD capability that will **Protect The Force** and **Conduct Precision Strike** on hostile theater missile launch sites, C4I capabilities, and infrastructure throughout all phases of a contingency. This effective, joint TMD capability will permit the Joint Force Commander to **Project and Sustain the Force** and **Dominate the Maneuver Battle** through effective use of mass, economy of force, maneuver, surprise, and security.

The Army's TMD program includes the four operational elements described in Joint Pub 3-01.5: Attack Operations, Active Defense, Passive Defense, and BM/C4I. These elements were initially referred to as operational TMD pillars in the Joint Tactical Missile Defense Operational Concept (SM-262-88, 4 April 1988) and the Theater Missile Defense Mission Needs Statement (JROCM-064-91, 18 November 1991).

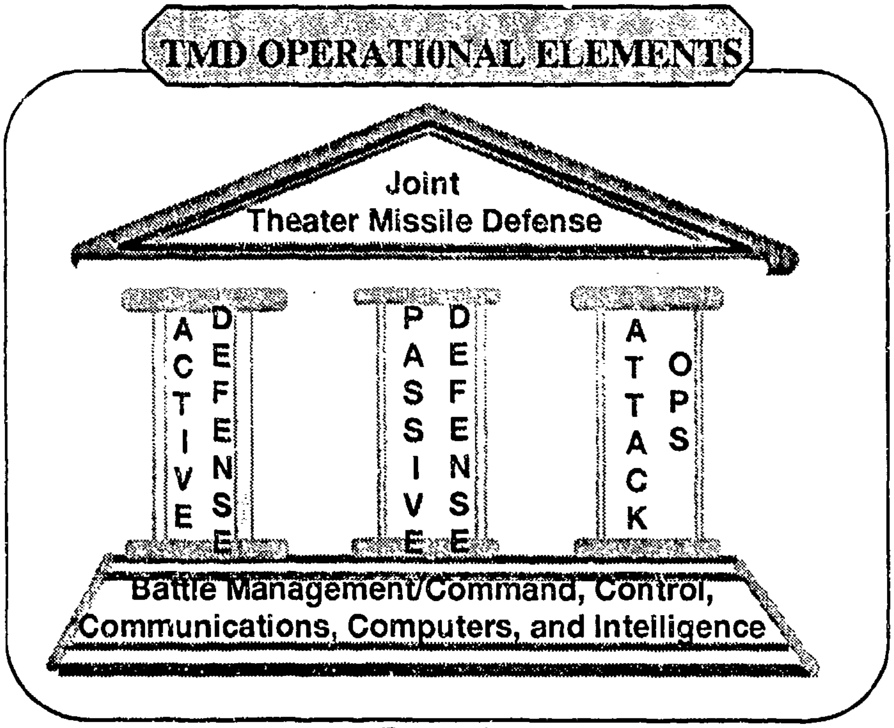


Figure J-5

Attack Operations include air, ground, space, and special operations conducted to prevent the launch of hostile theater missiles by striking missile launchers and their command and control, communications, logistics, reconnaissance, intelligence, surveillance, and target acquisition support.

Active Defense provides protection by destroying theater missiles, airborne launch platforms, and UAVs in flight. It includes multitiered defense in depth using air, ground, naval, and space assets.

Passive Defense includes operational security (OPSEC), deception, early warning, NBC defense, survivability and reconstitution measures taken to reduce the probability of, vulnerability to, and the effects of theater missile attack.

Battle Management/Command, Control, Communications, Computers, and Intelligence (BM/C4I) provides an integrated architecture that gives commanders at all levels the information, communications, automation, and facilities they require to plan and implement effective TMD operations.

Many actions the Army is taking to modernize TMD capabilities occur within individual operational elements; these actions are described in other annexes of this Plan: Annex E (Command, Control, Communications, and Computers); Annex I (Air Defense); Annex H (Fire Support); Annex O (Aviation); Annex S (Space); Annex P (Nuclear, Biological, and Chemical) and, Annex G (Intelligence and Electronic Warfare).

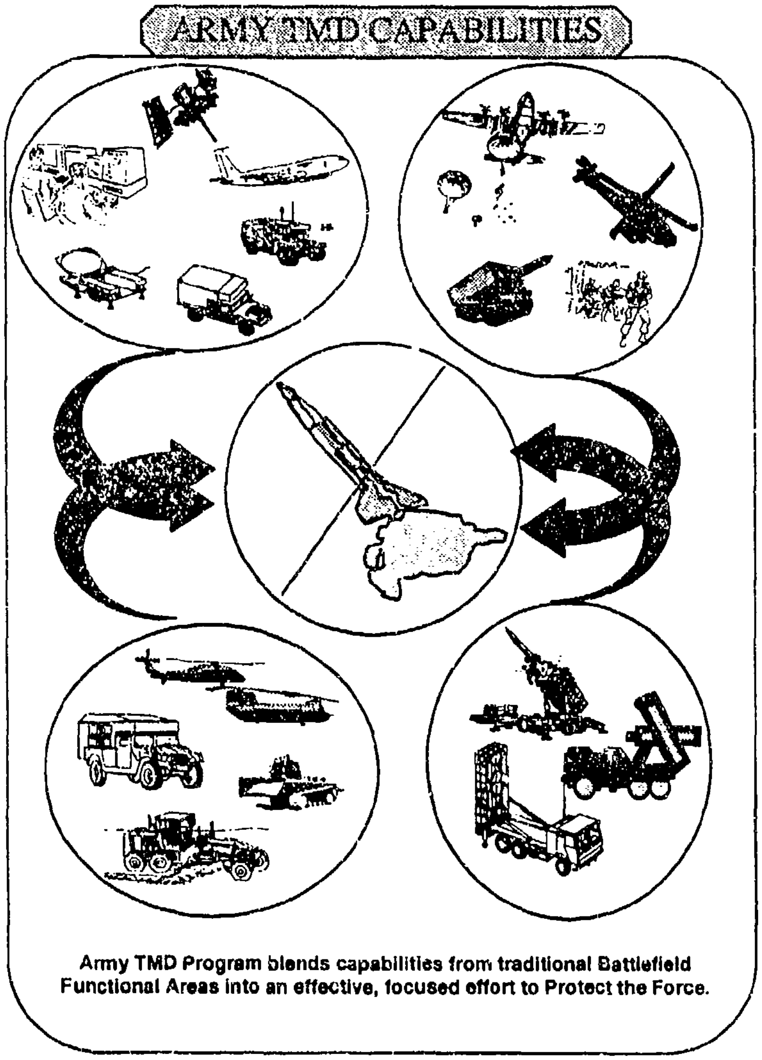


Figure J-6

This Annex describes the actions underway to integrate those operational elements into a potent capability; one that achieves maximum synergy in each of the four TMD operational elements. The Army's approach develops a TMD capability that contributes significantly to the National Military Strategy. Army TMD modernization initiatives provide missile defense systems that overmatch the projected threat and a TMD force with the mobility, lethality, and effectiveness to defend critical assets and maneuver forces. The capability to rapidly and effectively neutralize hostile theater missile threats serves to deter potential adversaries.

SECTION 2

WARFIGHTING CONCEPT

The Army of the 1990s and beyond is a force projection army. It's forces have strategic mobility, tactical maneuverability, and battlefield survivability. Commanders can deploy tailored units from U.S. and overseas bases, rapidly to contingency areas and quickly establish Land Force Dominance. The units will be part of a joint force or, they could be part of a multinational force. Missions will range from humanitarian relief (such as Operation RESTORE HOPE), to peacekeeping/making, (such as Operation PROVIDE COMFORT), to combat operations (as in Operations Desert Shield/Storm). Such operations have different objectives, require different force packages, have different operating environments and, depending on circumstances, require different emphasis on the various force projection stages shown in Figure J-7. However, each has a similar deployment pattern:

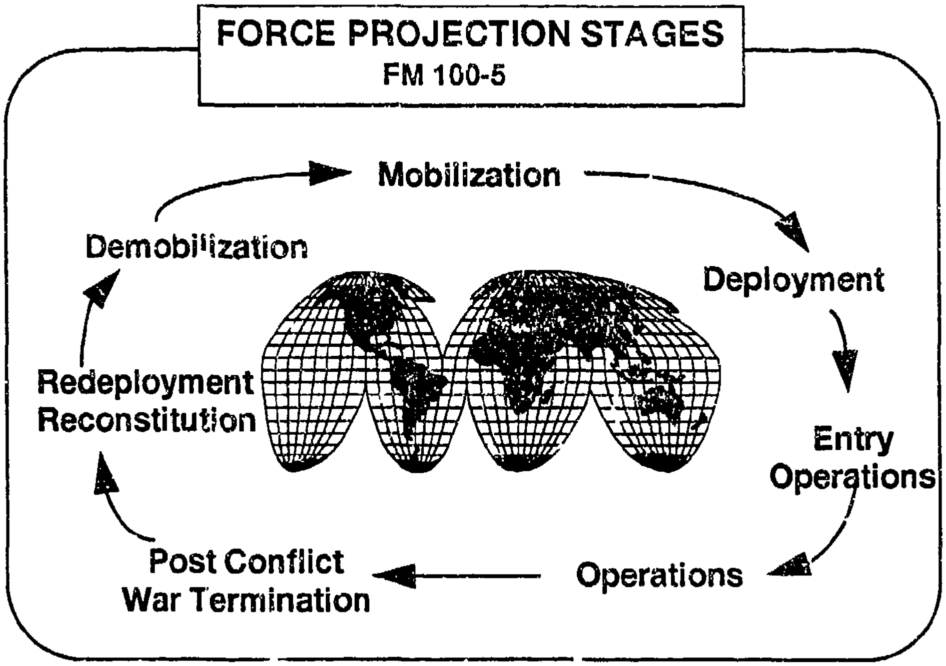


Figure J-7

- Phase 1: Rapid introduction of an initial presence into the operational area;
- Phase 2: Build up sufficient force to accomplish the mission.
- Phase 3: Accomplish mission; and
- Phase 4: Reconstitute and redeploy.

The Army provides the Joint Force Commander a balanced TMD capability based upon the threat. The TMD force, like other forces, are tailored to meet the commander's specific requirements; but the requirement can be elusive.

The threat is both complex and extensive. It goes beyond mere weaponry or clear objectivity.

The mere presence of hostile theater missile and UAV capabilities in an operational area, especially if they pose a mass destruction threat, creates significant political and diplomatic conditions. These, in turn, could impose equally significant constraints on military forces. The threat of a theater missile attack against U.S. troops by a hostile force--even a terrorist group--may create political and diplomatic pressures sufficient to force withdrawal of U.S. forces before they accomplish their mission. Such potential exists even during humanitarian missions.

A theater missile capability can be acquired with relative ease. Approximately 26 countries now possess Tactical Ballistic Missiles (TBM). Approximately 100 countries possess some form of TBM, cruise missile, or UAV capability. Although the number of countries with theater missile capability will remain constant, both improved technology and a large increase in the number of deployed systems by the year 2000 will pose significantly increased risks to deployed U.S. forces.

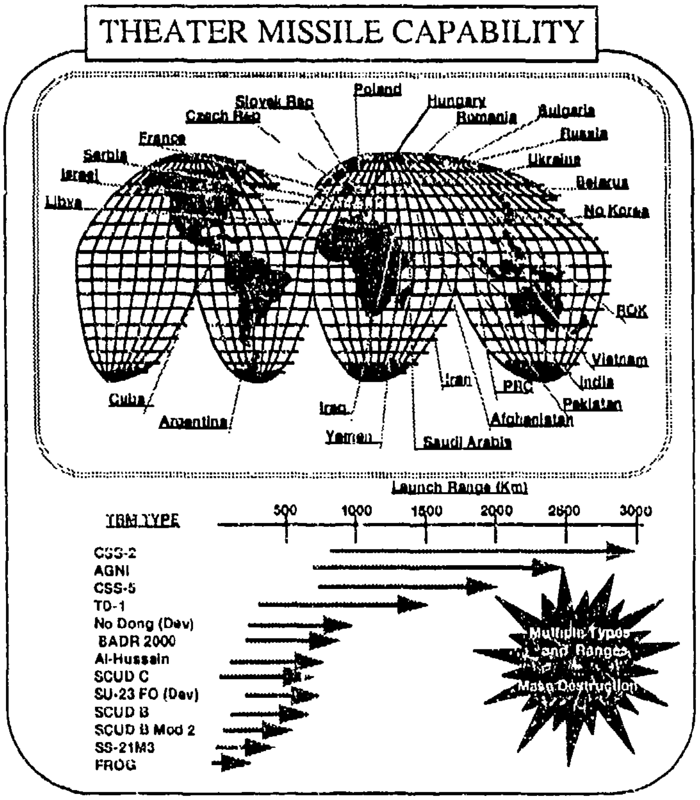


Figure J-8

The threat consists of theater missiles, to include TBM, cruise missiles, air to surface missiles, and UAVs (also drones and other remotely piloted vehicles). In addition to being relatively low technology and relatively inexpensive, these systems pose particular problems for a defender:

- TBM and cruise missile warheads are capable of delivering a variety of payloads--high explosive, chemical, biological, and nuclear.

- Tactical ballistic missiles are difficult to destroy because they can be launched covertly and have long ranges and short flight times. Once in flight, TBMs can employ a number of deliberate or inadvertent measures, such as maneuver, break-up, or debris, that complicate active defense operations. Further, theater missile launch vehicles are mobile and easily concealed, increasing their survivability.

- Cruise and air to surface missiles are difficult to destroy because they can be launched from a variety of platforms at long ranges, and can enter friendly airspace from any direction at low altitude. In addition, they present a relatively small radar cross section to sensors, reducing acquisition range and shrinking engagement battle space.

UAVs are small and may be constructed of a variety of materials, making them very difficult to detect. Although hostile forces may use UAVs to deliver weapons, they are typically intelligence collection and target acquisition platforms that use a variety of sensors to provide near real time information on the location, composition, and activities of U.S. forces.

The theater missile and UAV threat is not limited to critical assets and other strategic or operational targets. Maneuver forces are particularly vulnerable to precision guided UAVs and cruise missiles. Consider, for example, if Iraq had discovered VII Corps or XVIIIth Airborne Corps assembly areas through near real time UAV collection and attacked them with large numbers of cruise missiles armed with chemical munitions.

Protecting deployed U.S. forces against this sophisticated threat is an extremely difficult and complex task. it requires reaching across Army traditional functional area boundaries and using the capabilities of sister Services, and national agencies, and multinational forces. Successfully integrating the various capabilities found in the four TMD operational elements provides the Joint Force Commander the force protection required to execute each phase of power projection operations.

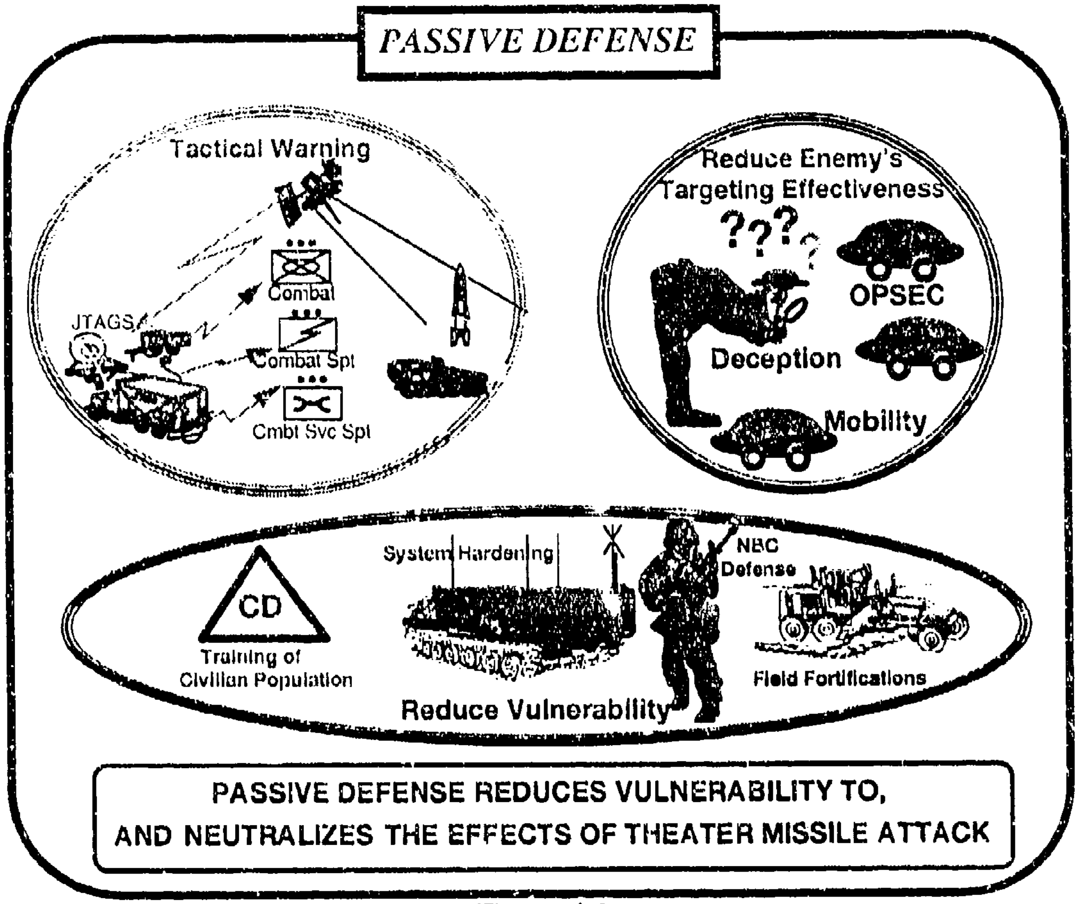


Figure J-9

PASSIVE DEFENSE. The Army employs passive defense measures before, during, and after an attack to provide individual and collective protection for friendly forces, population centers, and critical assets. Because of the extensive theater missile threat, some measure of passive defense is required in all force projection contingency requirements. As depicted in Figure J-9, the principal components of passive defense are:

Tactical Warning. Tactical warning is both the general warning that a hostile missile launch is imminent, or has occurred, and the specific warning that units or locations are actually threatened by the missile or missiles. Tactical warning requires effective, interoperable sensors and intelligence processors, plus automated, interoperable, redundant C4I systems, to ensure critical, time-sensitive intelligence is disseminated rapidly to units, locations, and--in the case of specific warnings--to individuals. Furthermore, the effectiveness of warning is also a function of standing operating procedures and training throughout the joint task force. Finally, the use of space plays an important role in Tactical Warning. Annex R, Space, examines this in detail.

Reducing Targeting Effectiveness. Deployed U.S. forces degrade the targeting capability of hostile forces through OPSEC measures, deception, and mobility:

- Effective OPSEC measures degrade the ability of hostile sensors, reconnaissance elements, and intelligence analysts to locate and identify friendly forces and locations. Deployed U.S. forces employ communications security, local physical security, counterreconnaissance/countersurveillance measures, and signature reduction measures such as camouflage, cover, concealment, and emissions control, to deny hostile forces accurate and timely information.

- Effective deception misleads and confuses hostile decision-makers by providing false or misleading information to their intelligence collection and target acquisition assets. Deployed U.S. forces tailor their deception activities in relation to the specific collection means of a hostile force.

- Changing one's location frequently, and faster than the hostile intelligence agency can process information from sensors and reconnaissance elements, reduces the likelihood of being targeted.

Reducing Vulnerability. A number of passive defense measures will reduce the effectiveness of theater missile attacks and will conserve the combat power of deployed forces:

- During materiel acquisition, the Army ensures critical systems are "militarized" (or "ruggedized") or hardened, so as to operate effectively in environments that might be subject to theater missile attacks. Building systems that can withstand Electromagnetic Pulse (EMP) is an example of hardening; hardened systems are less vulnerable to the effects of TM attack. Further, our forces can take steps themselves to decrease their vulnerability to, or reduce the effectiveness of, a TM attack. For example, during deployment, U.S. forces use site reconnaissance and selection, field fortifications, dispersal, and ensure critical functions and capabilities remain intact by using backup or alternate systems (redundant or robust means) to reduce vulnerability to attack. Forces also have postattack recovery and reconstitution procedures which reduce the effectiveness of such attacks.

- The Army's Force XXI concept of operations means large numbers of Combat Support (CS) and Combat Service Support (CSS) forces can remain outside theaters of operation or within the U.S. This "split-based" structure reduces forward deployed infrastructure and troops, meaning neither are vulnerable to TM attack.

- The use of theater missiles as weapons of mass destruction is an implicit aspect of the threat. Ensuring deployed U.S. forces are trained and equipped with: the means to rapidly and accurately detect contamination; individual and collective NBC protective equipment; and the capability to decontaminate personnel, equipment, and

facilities quickly and completely; are key to reducing their vulnerability and preserving the force.

• U.S. forces also may train local civil authorities to take civil defense measures to reduce the vulnerability of civilian populations to attack. Timely warning of civilians is a key element in reducing the risk, and may decrease the political and diplomatic impact of a hostile force's theater missile capability.

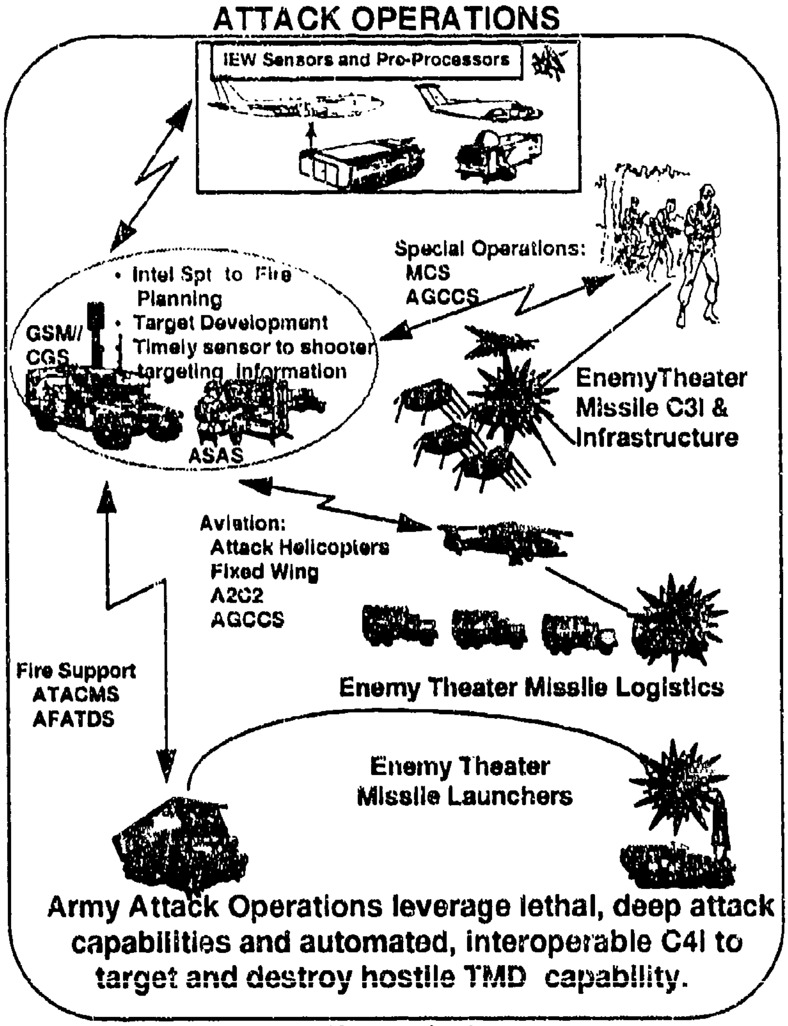


Figure J-10

ATTACK OPERATIONS. TMD attack operations are offensive actions taken to prevent the launch of TM or destroy or disrupt the threat's TM capability. Such actions include: destroying launch platforms, destroying reconnaissance, intelligence, surveillance, and target acquisition assets; destroying or disrupting C3I nodes and other infrastructure; and destroying missile stocks and other critical logistics facilities. Attack operations are the doctrinally preferred TMD.

TMD attack operations are executed in accordance with the Army's DECIDE, DETECT, DELIVER targeting methodology, and are critical elements of the commander's deep battle. Because theater missile assets are difficult to detect and may be fleeting targets, such operations require timely, accurate, and relevant all-source intelligence support plus rapid targeting capabilities. Attack operations can be conducted via long-range fire support assets, fixed and rotary wing aircraft, and maneuver or special operations forces. The automated interfaces and common view of the battlefield provided by the Army Tactical Command and Control System (ATCCS) are key to successfully planning and executing TMD attack operations.

ACTIVE DEFENSE. Although Army TMD intends to destroy hostile theater missile capabilities through attack (offensive) operations, some theater missiles and UAVs will likely be launched against deployed forces and critical assets. This makes active defense a critical TMD operational element. It protects the force by destroying hostile theater missiles, airborne launch platforms, and UAVs in flight. Due to the threat from weapons of mass destruction, the defense must be wide area and nearly leak-proof. Thus, the Army's warfighting concept employs a family of complementary and interoperable weapons and BM/C4I systems that provide a multitiered defense in depth and have the tactical mobility and operational agility to protect maneuver forces and critical assets.

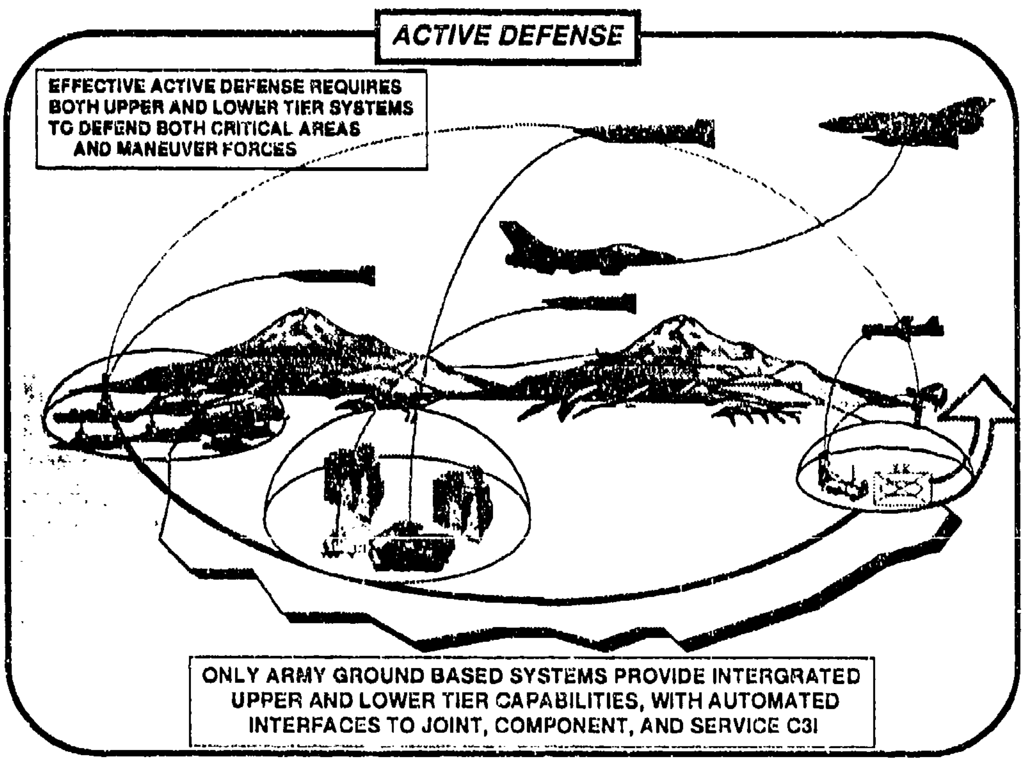


Figure J-11

The operational requirement to minimize the number of missiles which "leak through" the defense is the basis of the Army's multitiered approach. Active Defense upper tier missiles operate at long ranges against hostile targets both in and above the atmosphere. They are very lethal against tactical ballistic missiles, re-entry vehicles, and high altitude cruise missiles. Lower tier systems are aerodynamic missiles that depend on the atmosphere's resistance to steer themselves. They defend maneuvering forces to altitudes of 25-30 km against short and medium range tactical ballistic missiles, low altitude cruise missiles, and aircraft. But they are also capable of defeating longer range tactical ballistic missiles that have re-entered the atmosphere.

An operational concept that envisions sole use of upper tier missiles ignores a large portion of the theater missile threat, and leaves maneuver forces without any means to defend themselves. A concept employing only lower tier missiles is high risk because it engages multiple, high velocity, maneuverable targets at relatively short range. This leaves only a limited opportunity to re engage missed targets. The Army's two tier system employs the Theater High Altitude Area Defense (THAAD) system, PATRIOT Advanced Capability-3 (PAC 3), and Corps SAM as complementary missile systems to defend maneuver forces and in theater critical assets. This ensures a capability to engage all threat systems at maximum ranges, using all the battle space available to obtain multiple engagements against incoming missiles. The two tier system is designed to overmatch all current and projected theater missile and UAV threat systems.

Army Air Defense units at division, corps, and Echelons Above Corps (EAC) execute TMD active defense. Corps and divisional systems, such as Corps SAM provide support to maneuver forces and EAC units (PATRIOT PAC 3 and THAAD) support the joint force commander by establishing active theater missile defense enclaves to protect critical areas. The Army coordinates active defense efforts through its integrated Air Defense C4I system at each echelon of command, assisted by automated interfaces with ATCCS, joint, sister Service, and multinational C4I systems.

BATTLE MANAGEMENT/COMMAND, CONTROL, COMMUNICATIONS COMPUTERS, AND INTELLIGENCE (BM/C4I). The underlying capability that separates the Army's TMD program from its "stove pipe," piecemeal predecessors, is an effective BM/C4I system that can fuse disparate, geographically separated TMD passive, active, and attack capabilities into a focused effort. This allows U.S. forces to detect theater missile targets and react with a speed well within the enemy's decision cycle and fast enough to neutralize and destroy his theater missile capability.

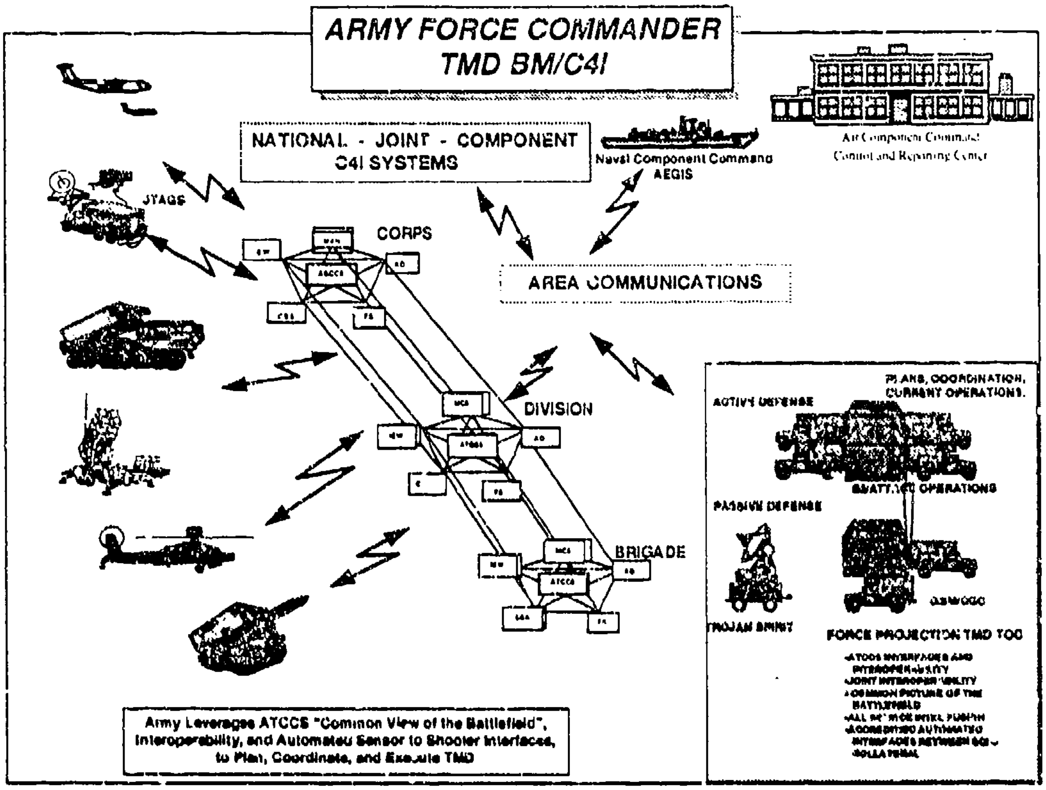


Figure J-12

The Army Battle Command System (ABCS) is the Army's portion of the Joint Global Command and Control System and a critical BM/C4I element in TMD warfighting. The Army Global Command and Control System (AGCCS) is the EAC component of ABCS and ATCCS is the tactical component at echelons corps through brigade. ATCCS provides automated interfaces between deployed Army units and national, joint, sister Service, and multinational C4I systems. This rapid exchange of critical, accurate information, allows commanders and battle staffs at each echelon to form a common picture of the battlefield, quickly make necessary decisions, and rapidly issue clear orders, which are key factors in successful TMD.

Additional BM/C4I elements in the Army's TMD warfighting concept include: the use of broadcast communications, to provide information and intelligence to recipients simultaneously rather than sequentially; the increased use of satellite communications for reliable, high capacity, long distance communications; and the use of high capacity, reliable, digital communications, such as the Joint Tactical Information Distribution System (JTIDS), within tactical units. The combined effect is that units can be widely dispersed, yet electronically collocated. Electronic co-location increases information distribution efficiency for TMD tactical warning, active defense, and attack operations and allows split-based operations. This decreases the number of combat support and combat service support units in the operational area which are vulnerable to theater missile attack.

Timely, accurate, and relevant intelligence is vital to the TMD decision-making cycle. The Army uses organic BM/C4I assets, such as the All Source Analysis System (ASAS) and the other ATCCS battlefield functional area systems, to focus strategic, operational, and tactical intelligence efforts to meet the commander's TMD information requirements.

Army ground-based and aerial sensors--both stand-off aircraft and penetrating UAVs--collect signals intelligence (SIGINT), imagery intelligence (IMINT), and radar intelligence (RADINT). Preprocessors, such as the Joint Surveillance Target Attack Radar System (JSTARS) Ground Station Module/Common Ground Station (GSM/CGS), Tactical Exploitation of National Capabilities (TENCAP) systems, and the Defense Support Program sensor's Joint Tactical Ground Station (JTAGS) receive and process near real time sensor data and other intelligence products and provide the results of their analyses to ASAS analysts. However, to minimize sensor to shooter timelines during the execution phase of attack operations, GSM/CGS operators provide immediate targeting information directly to fire support units through automated ATCCS interfaces.

The ASAS operators fuse this Army derived intelligence with that received from supporting national, joint, sister Service, and allied intelligence organizations and assets. The operators sanitize the intelligence and disseminate it at no higher than a Secret level, to provide warfighters the timely intelligence and targeting information needed for successful TMD operations.

SECTION 3

CURRENT PROGRAM ASSESSMENT

As shown by Figure J-13, the Army assesses TMD capability as **AMBER** in the near- and mid-terms and **GREEN** in the far-term, in accordance with the following criteria:

- **RED** - No existing capability or existing capability is incapable of defeating the threat or providing required support;
- **AMBER** - A limited capability or quantity exists to perform the mission; and
- **GREEN** - Adequate capability and quantity exists to perform the mission.

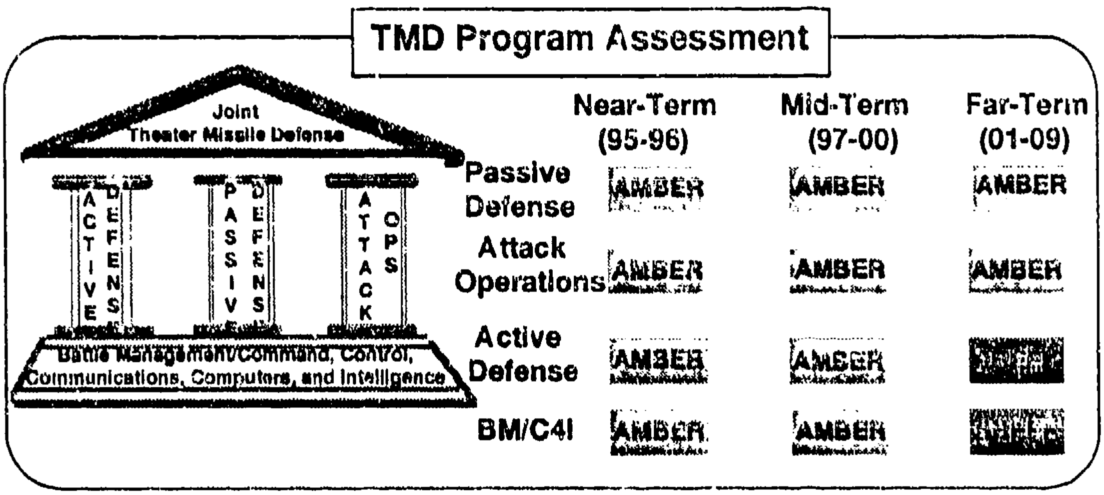
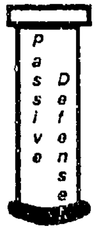


Figure J-13

PASSIVE DEFENSE. Force protection is a fundamental requirement. Not only is it one of the Army's modernization objectives, but it is also one of the four basic dynamics of combat power detailed in *FM 100-5*. The Army's TMD program depends on passive defense to successfully protect the force. In combat operations, despite highly effective active defense and attack operations, some hostile theater missile warheads may strike deployed U.S. forces or critical areas. If the missile is delivering a warhead with a weapon of mass destruction, only effective passive defensive measures will prevent unacceptable casualties. In many Operations Other Than War (OOTW), active defense and attack operations may not be appropriate at all. Without effective passive defensive measures, a hostile theater missile strike would be disastrous.

Passive Defense Assessment



	Near-Term (95-96)	Mid-Term (97-00)	Far-Term (01-09)
Passive Defense	AMBER	AMBER	AMBER

Figure J-14

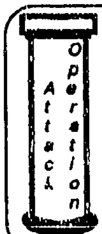
The passive defense assessment from a TMD perspective is as shown in Figure J-14. The near-term assessment improves from the previously **RED** rating to **AMBER** because of the fielding of a biological agent detection capability and JTAGS to disseminate Defense Support Program warning messages directly to Theaters.

The assessment remains **AMBER** through the mid-term because of the lack of a stand-off, multi-agent, chemical and biological agent detection capability and individual and collective NBC protective equipment leaves theater forces and facilities with a high degree of vulnerability and susceptibility. The assessment becomes **GREEN** during the far-term due to expected improvements in protective equipment.

Programs contributing to passive defense are described and assessed in Annex P (Nuclear, Biological, and Chemical), Annex S (Space), and Annex R (Training).

ATTACK OPERATIONS. Attack operations are the doctrinally preferred method of TMD because they destroy or disrupt the enemy's capability to launch theater missiles, which reduces the risk to friendly forces and facilities to a minimum.

Attack Operations Assessment



	Near-Term (95-96)	Mid-Term (97-00)	Far-Term (01-09)
Attack Operations	AMBER	AMBER	AMBER

Figure J-15

From a TMD perspective the attack operations capability is assessed as shown in Figure J-15. The near-term assessment of **AMBER** is based on the ability to detect, identify, locate and attack hostile theater missile capability provided by current systems such as Hunter UAV, Mobile Integrated Tactical Terminal (MITT), the prototype JSTARS E-8A, the prototype JTAGS, Army Tactical Missile System (ATACMS), the AH-64 Apache, and special operations forces. In the mid-term, ATACMS Block IA, and Apache Longbow will increase the range at which the Army can strike hostile theater

missile forces and the Medium Altitude-Endurance UAV will detect, classify, and identify TM elements at operational depths. In addition, mid-term improvements to the Army's FIREFINDER radar will permit the detection and accurate location of missile launches. In the far-term, the objective FIREFINDER product improvement will extend the system's range.

However, attack operations remain **AMBER** because the growing threat requires a timely, all weather, day/night anti-theater missile strike capability at ranges up to 500 km. Currently programmed fire support and IEW systems provide only limited capability to meet this requirement. This shortfall continues into the far-term.

Programs that provide the Army's capability to strike at the enemy's theater missile launchers, C4I and infrastructure, and missile stocks and other logistics capabilities are discussed in Annex H (Fire Support), Annex O (Aviation), Annex S (Space), and Annex G (Intelligence and Electronic Warfare), which provide specific functional area assessments.

ACTIVE DEFENSE. During the 1990s, successful execution of the National Military Strategy will come to rely preponderantly on force projection. At the same time, the capability of hostile forces to interdict ports, airfields, and other entry points with theater missiles will improve dramatically. An effective active defense capability is essential, because force projection units are most vulnerable to defeat while entering the area of operations, when the organization and forces required for passive TMD defense and TMD attack operations may not be established. The importance of active defense continues throughout the operation as force protection provides the commander the ability to build strength quickly, maneuver freely, and reconstitute/redeploy securely.

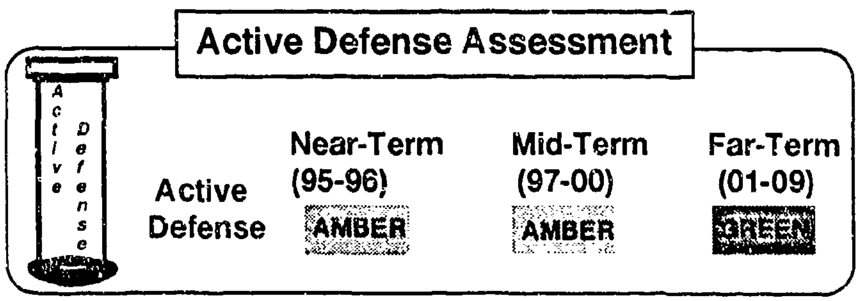


Figure J-16

From a TMD perspective, active defense is assessed as shown at Figure J-16. Near-term capabilities are **AMBER** because existing PATRIOT PAC 2 and forward area air defense assets provide limited capabilities against the current theater missile threat. The assessment remains **AMBER** over the mid-term. Even though fielding PAC-3 and the THAAD User Operational Evaluation System (UOES) provides an effective two tier defense against tactical ballistic missiles, significant shortfalls exist in the ability to counter cruise missiles and UAVs, to protect maneuver forces, and to interoperate with joint and multinational forces. The far-term assessment is **GREEN** because Corps

SAM fielding permits truly effective two tier active defense of both maneuver forces and critical assets. In addition, complete fielding of FAADC2 and other ATCCS battlefield functional area systems and implementation of the joint GCCS and AGCCS systems will provide automated, integrated, and interoperable joint active defense C4I.

Annex I (Air Defense) thoroughly discusses and provides a detailed assessment of numerous programs that contribute to TMD active defense.

BATTLE MANAGEMENT/COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE. U.S. Army Space Command and PM Air Defense Command and Control Systems (ADCCS) are developing a prototype Force Projection TMD TOC that integrates the C4I systems supporting the TMD operational pillars in six HMMWVs. The TOC is currently planned to support CINC TMD exercises and experiments to develop and refine BM/C4I requirements. It is rapidly deployable and available to provide contingency support to deployed commanders as required.

During the near- and mid-terms, the services will field JSTARS GSM/CGS and E-8C aircraft, UAV Close Range and Medium Altitude-Endurance, JTAGS, ATCCS systems such as ASAS and FAADC3I, and communications systems/capabilities such as Trojan SPIRIT, and Broadcast Communications. Not only do these systems represent a significant improvement in Army TMD capability, they all were developed with joint interoperability as a major requirement. Joint interoperability, so essential to successful TMD, also will be enhanced as OSD and Joint Staff C4I interoperability efforts, such as systems migration, C4I for the Warrior, and Global Command and Control System, evolve into maturity.

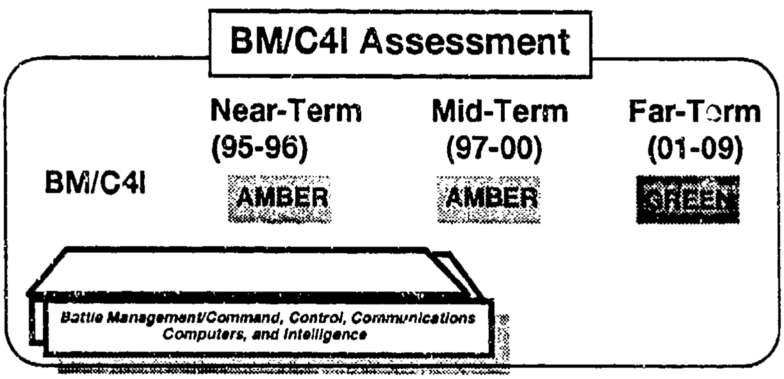


Figure J-17

However, the overall TMD assessment remains **AMBER** until the far-term because the communications requirements of TMD may overwhelm the capacity of available communications architectures. The Army, through the Integrated Battlefield Architecture and Army Digitization Office initiatives, and OSD, in the Targeting Support for Stand-off Weapons Study, continue to address this issue. The process of validating architecture requirements and developing feasible and affordable solutions to identified shortfalls is key to acquiring a fully functional TMD BM/C4I capability.

Detailed assessments on systems contributing to TMD BM/C4I are included in Annex E (Command, Control, Communications, and Computers), Annex S (Space), and Annex G (Intelligence and Electronic Warfare).

SUMMARY. The Army's TMD concept integrates existing combat and combat support capability and ongoing modernization efforts through doctrine, tactics, techniques, and procedures, into a responsive tool that protects deployed forces and defeats hostile theater missile threats. The tool is available to joint force commanders during force projection conti[illegible] [illegible]ging from peaceful Operations Other Than War to combat in the midst of an [illegible] [illegible]onal conflict.

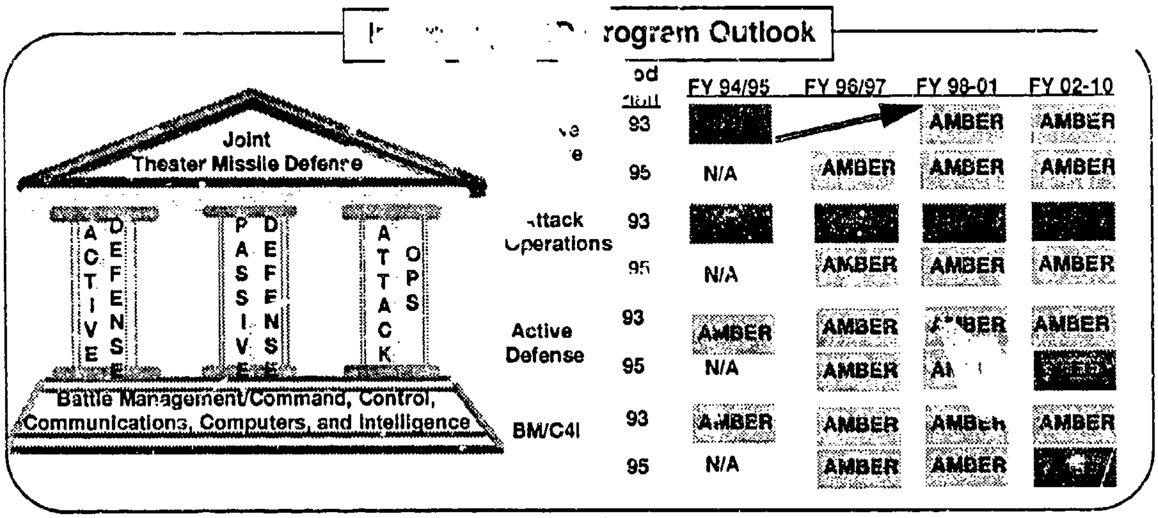


Figure J-18

The 1995 Force Modernization Plan assessment reflects the progress made during two years of integration and modernization effort in response to the theater missile threat. However, there are specific modernization efforts that must continue for this assessment to remain valid:

- Passive Defense:

  - Joint Tactical Ground Station;
  - Biological Agent Detection; and
  - Improved Biological Agent Immunization.

- Attack Operations:

  - ATACMS Block IA; and
  - APACHE LONGBOW.

- Active Defense:

  -- PATRIOT PAC 3;
  -- THAAD; and
  -- Corps SAM.

- BM/C4I:

  -- ATCCS fielding to the force;
  -- Global Command and Control System;
  -- JSTARS GSM/CGS and E-8C;
  -- Hunter and Endurance UAVs;
  -- Joint Tactical Ground Station; and
  -- TMD Force Projection TOC.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

The Army's capstone TMD Research, Development, and Acquisition (RD&A) strategy is to match TMD requirements in the four operational elements with capabilities provided through ongoing battlefield functional area materiel development. If necessary, requirements documents, such as an Operational Requirements Document (ORDs), are amended to ensure a required TMD capability is provided or enhanced. The intent is to build flexibility into the acquisition process to shape an effective response to an evolving threat.

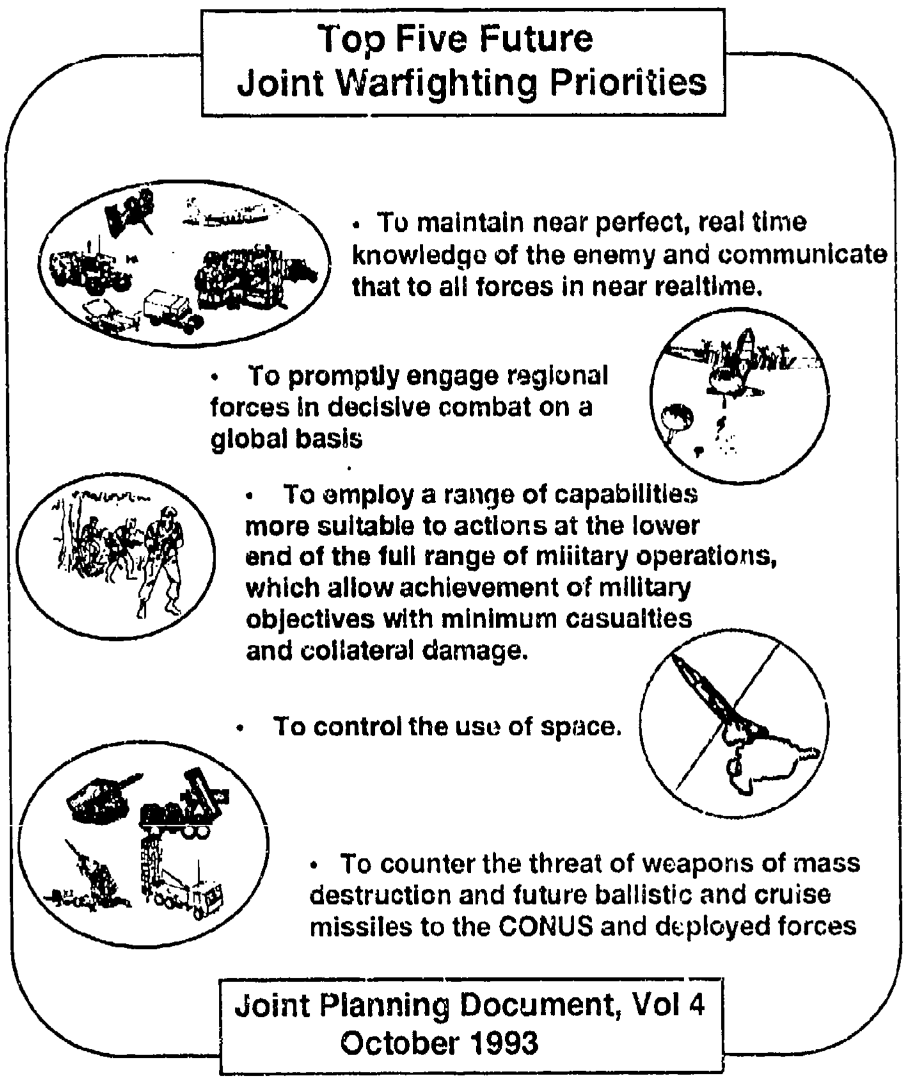


Figure J-19

In Volume 4, of the Joint Planning Document, published in October 1993, the Joint Chiefs of Staff prioritized the top five future joint warfighting required capabilities. This section describes the linkage between the general battlefield functional area RD&A strategies described in other annexes, the top five future joint warfighting requirements, and specific TMD operational elements.

PASSIVE DEFENSE. Capabilities inherent in TMD passive defense measures support three of the five future joint warfighting priorities by communicating threat information to all forces in near real time, by achieving military objectives with a minimum of casualties and collateral damage, and by countering the threat of theater missiles and weapons of mass destruction. The Army's RD&A strategy is to improve the capability of the force to protect itself against weapons of mass destruction, to modify the logistics system to present fewer lucrative, vulnerable targets to hostile forces, and to improve C4I to ensure timely warning and permit greater dispersion.

To increase the force's capability to protect itself against weapons of mass destruction, the Army will improve individual and collective protective measures, contamination avoidance capabilities, and decontamination capabilities.

- In the near- and mid-terms the Army will reduce the size, weight, and power requirements of collective protective equipment and field improvements to individual protective equipment and NBC equipment for integrated command posts. The Advanced Integrated Individual Protection System and Multi-Purpose Collective Protection will be developed over the mid- to far-terms.

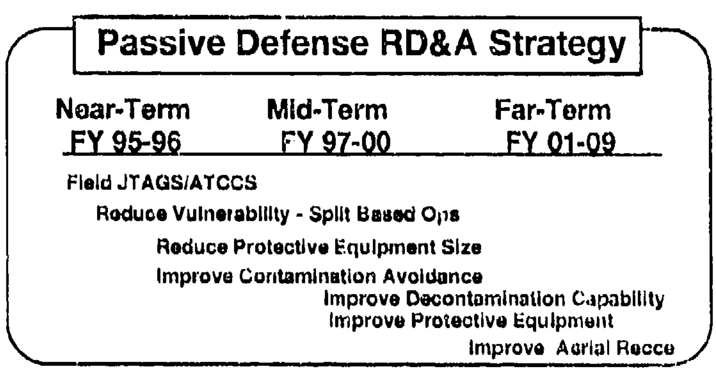


Figure J-20

- Improvements to contamination avoidance capabilities over the near- and mid-terms include fielding the Biological Integrated Detection System and development of an aerial reconnaissance capability for nuclear contamination. Far-term improvements call for the development of improved aerial and stand-off chemical and biological detection systems.

• Decontamination improvements include fielding a modular decontamination capability in the mid-term and, into the far-term, development of advanced, non-corrosive decontaminants, self-decontaminating coatings, and decontaminants for electronics and avionics.

Logistics modernization will implement split-based operations to decrease the combat service support infrastructure deployed during force projection operations. This will result in decreasing the number of soft targets vulnerable to theater missile attack. Accomplishing this objective requires continuing improvements over the mid- to far-terms in airlift (C-17) and sealift (Fast Sealift Ships, Large Medium Speed Roll on/Roll off), C4I improvements such as the Combat Service Support Command and Control System (CSSCS) node of ATCCS and use of broadcast information technologies, and modernization of the Army's wheeled vehicle fleet to ensure rapid materiel distribution from ports of debarkation to tactical units.

A number of C4 initiatives over the near- and mid-terms also will significantly improve TMD passive defense. Chief among these are the continued development and fielding of JTAGS and ATCCS and development of the joint GCCS and AGCCS. In addition, developing air defense radar, such as the MPQ-53 and THAAD Ground-Based Radar, include the capability to determine missile launch and impact points. These initiatives improve the ability to disseminate timely and accurate TMD warning within the Army and ensure enhanced joint and interservice interoperability.

Specific RD&A strategies to accomplish these objectives are detailed in Annex P (Nuclear, Biological, and Chemical), Annex Q (Medical), Annex M (Logistics), Annex L (Tactical Wheeled Vehicles), Annex S (Space), and Annex E (Command, Control, Communications, and Computers).

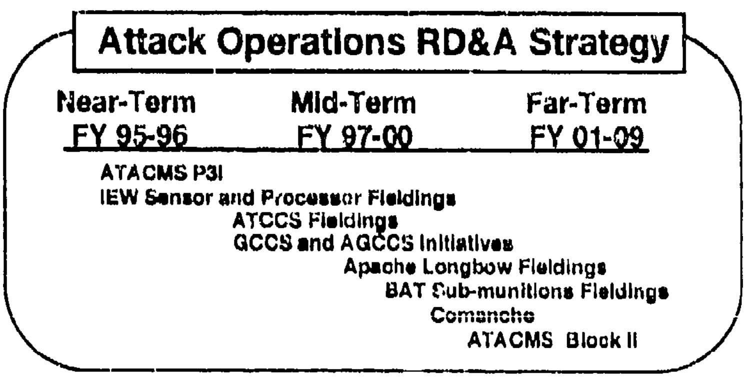


Figure J-21

ATTACK OPERATIONS. The Army will conduct TMD attack operations with long-range surface to surface fires, attack aviation, special operations forces, and maneuver forces. These operations provide capabilities required by three of the top five future joint warfighting capabilities. They decisively engage regional forces, employ a range of capabilities, minimize casualties and collateral damage, and counter the threat of theater missiles and weapons of mass destruction.

The TMD attack operations modernization strategy includes improving sensors, weapons systems, munitions, and C4I. In the near- and mid-terms, Intelligence & Electronic Warfare system fielding will have a significant impact on TMD attack operations. New sensor fieldings include Hunter UAV, Medium Altitude-Endurance UAV, and JSTARS. Guardrail Common Sensor, with its ability to provide targetable SIGINT, will complete fielding to all Corps. Collateral information from all these sensors will be received, processed, analyzed, and disseminated as immediate targeting support by operators in the JSTARS GSM, which will be distributed in significant numbers throughout the Active Army by the end of FY 99. Enhanced All Source Analysis System (ASAS) Block I capability also will be distributed to the Active Army by the end of FY 99. ASAS interoperability, collection management, situation analysis, intelligence preparation of the battlefield (IPB), and target development capability will focus the national, joint, and tactical intelligence communities on TMD intelligence requirements and provide timely, accurate, and relevant intelligence for attack operations.

The AN/TPQ-37 FIREFINDER Radar Improvement Program will begin in FY 96. This program will upgrade Block I systems to detect and locate tactical ballistic missiles at ranges up to 100 km. In the FY 03 timeframe, the P3I FIREFINDER, with greater acquisition ranges, will start fielding.

A number of additional C4I initiatives over the near- and mid-terms also will significantly improve TMD attack operations. Chief among these are the continued development and initial fielding of JTAGS, the Advanced Field Artillery Tactical Distribution System (AFATDS)--the fire support node of ATCCS, and development of GCCS/AGCCS. This will not only improve the capacity, accuracy, processing, and interoperability of Army fire support command and control elements, but also ensure enhanced interoperability with joint and sister Service units. In addition, TMD attack operations will benefit from the fieldings of the intelligence communications systems Trojan SPIRIT and Commanders' Tactical Terminal-Hybrid (CTT-H), which will allow tactical Army units to pull required intelligence and intelligence products from any echelon and to receive timely broadcast intelligence.

Fire support modernization strategy to improve TMD attack operations is primarily centered around improvements to ATACMS and munitions. ATACMS Block IA, which effectively doubles the missile's range, fields in the near-term and mid-term. The Block II ATACMS, which delivers Brilliant Antiarmor Technology (BAT) submunitions, begins fielding in the far-term. Aviation TMD modernization in the mid- to far-terms consists of upgrading APACHE attack helicopters to the AH-64D APACHE LONGBOW models that have enhanced deep operations and precision strike capabilities due to their increased lethality and survivability. Development of the RAH-66 COMANCHE over the mid- to far-terms, and its initial fieldings in the far-term, will improve target acquisition capability in heavy divisions and attack operations in light forces.

Specific strategies for accomplishing these TMD attack operations Research, Development, and Acquisition (RDA) objectives are contained in Annex G (Intelligence and Electronic Warfare), Annex H (Fire Support), Annex O (Aviation), Annex S (Space), and Annex E (Command, Control, Communications, and Computers).

ACTIVE DEFENSE. With its mixture of weapons and sensor capabilities, TMD Active Defense provides capabilities demanded by all five of the future joint warfighting capabilities. To provide a near leak proof defense that addresses the full threat spectrum and maintains a significant technology advantage, the Army is pursuing a three phased TMD Active Defense RD&A strategy to procure a family of complementary, interoperable systems.

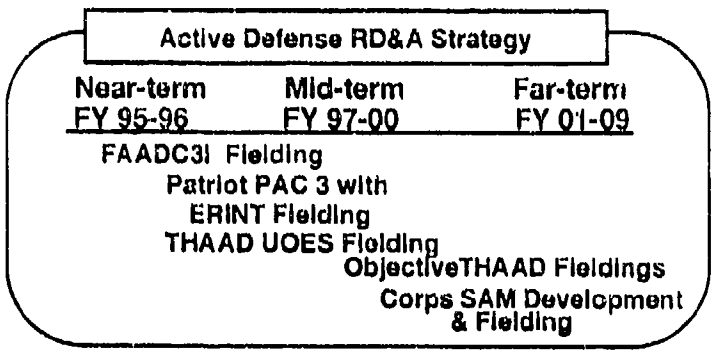


Figure J-22

In the near- and mid-terms, limited active defense capabilities are to be provided by procuring and fielding PATRIOT PAC 3 with Extended Range Intercept Technology (ERINT). This will significantly increase PATRIOT's lethality against theater missiles by providing a "hit-to-kill" capability at extended ranges and 16 agile guided missiles per ERINT equipped PATRIOT launcher.

In the mid-term, THAAD procurement gives the Army a truly effective upper tier defense against tactical ballistic missiles. THAAD provides a long-range, high altitude missile with "hit-to-kill" capability that will operate in enclaves with PATRIOT units to protect critical theater assets.

In the far-term, the Army plans to procure the strategically mobile, tactically deployable, medium to low altitude air defense weapon. Corps SAM represents "leap ahead" technology to protect mobile corps and division forces and enhance the doctrinal two tier system provided by THAAD and PATRIOT PAC 3.

Annex I (Air Defense) provides a detailed explanation and discussion of the specific RD&A strategies that contribute to TMD Active Defense.

BATTLE MANAGEMENT/COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE. TMD BM/C4I capabilities support all five of the future joint warfighting capabilities in the near- to mid-terms and enhance TMD effectiveness during force projection contingencies through the spectrum of Operations Other Than War to intense combat.

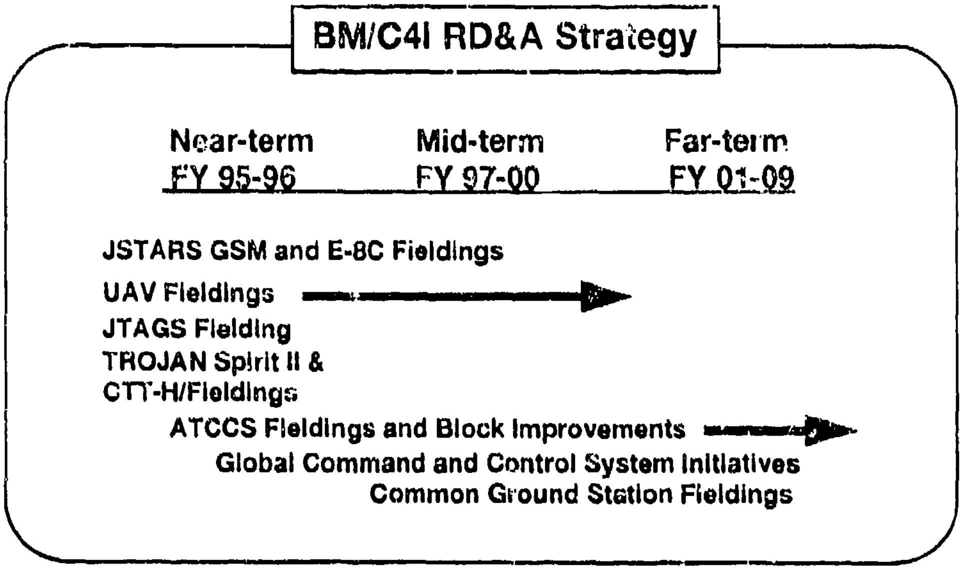


Figure J-23

In addition to the prototype Force Projection TMD TOC being demonstrated by U.S. Army SPACECOM and PM ADCCS, a number of other C4I initiatives over the near- and mid-terms significantly improve TMD capabilities within all the operational elements. Chief among these are the continued development and initial fieldings of ATCCS and development of the joint GCCS and AGCCS. This improves command and control and interoperability within an Army component and ensures enhanced interoperability with joint and sister Service units. In addition, fielding Trojan SPIRIT and Commanders Tactical Terminal-Hybrid (CTT-H) allows tactical units to receive broadcast intelligence and to "pull" required intelligence and intelligence products from national, theater, and tactical intelligence producers. Trojan SPIRIT and CTT-H also will be fielded to joint forces and sister Service units.

In the near- and mid-terms, Intelligence and Electronic Warfare system fielding will have a significant impact on TMD capabilities. Hunter UAV fielding begins in FY 95 and continues through the mid-term, and an Endurance UAV capability also will field in the mid-term. JTAGS fielding in the near-term provides theater commanders near real time missile warning, trajectory, launch point, and impact point information by processing stereo Defense Support Program sensor data. The JSTARS E-8C initial operating capability is in FY 97 and fielding continues through the mid-term. Guardrail Common Sensor, with its ability to provide targetable SIGINT, will complete fielding to all Corps. JSTARS GSM fielding begins in FY 96 and by FY 99 all active component units will have received at least a limited number of systems.

The Block I GSM receives, processes, analyzes, and distributes near real time data from the JSTARS E-8C and UAVs, and receives intelligence reports over CTT-H. It provides TMD attack operations units near real time targeting information to support engagement. In FY 98 the Army will increase the number of sensors with which the system interoperates by producing Block II GSM/CGS and upgrading Block I to CGS standards.

ASAS fielding will continue to all active units in the mid-term, and systems will be continuously upgraded through the application of capability packages based on Block II development and rapid prototyping in the far-term, the Army will field ASAS Block II throughout the active and reserve components. The interoperability. collection management, situation analysis, IPB, and target development capability provided by ASAS will serve to focus the national, joint, and tactical intelligence communities on TMD intelligence requirements and provide timely, accurate, and relevant intelligence for passive defense, active defense and attack operations.

The specific RD&A strategies contributing to TMD BM/C4I are detailed in Annex E (Command, Control, Communications, and Computers), Annex S (Space), and Annex G (Intelligence and Electronic Warfare).

SECTION 5

TRAINING

The National Military Strategy to rely on a primarily CONUS based, force projection military, requires units ready to deploy quickly and execute a variety of missions with a high degree of competence. Effective training is an essential component of such readiness; and, because of the increasing threat to force projection operations posed by theater missiles, TMD must be a continuing and integral part of unit training.

The Army's Combat Training Centers (CTC) provide intense, realistic combat training to combined arms units up to brigade size. Improvement in tactical BM/C4I is a major goal of CTC training and the threat of tactical weapons of mass destruction continues to be a key part of the training scenarios. Operations Other Than War and low intensity conflict as part of a small joint task force will consume a growing portion of unit training time at the CTCs. As training units are task organized during training to perform a broader range of tactical operations than they would as part of a division conducting conventional operations, the conduct of TMD attack and active defense operations will become part of the CTC curriculum.

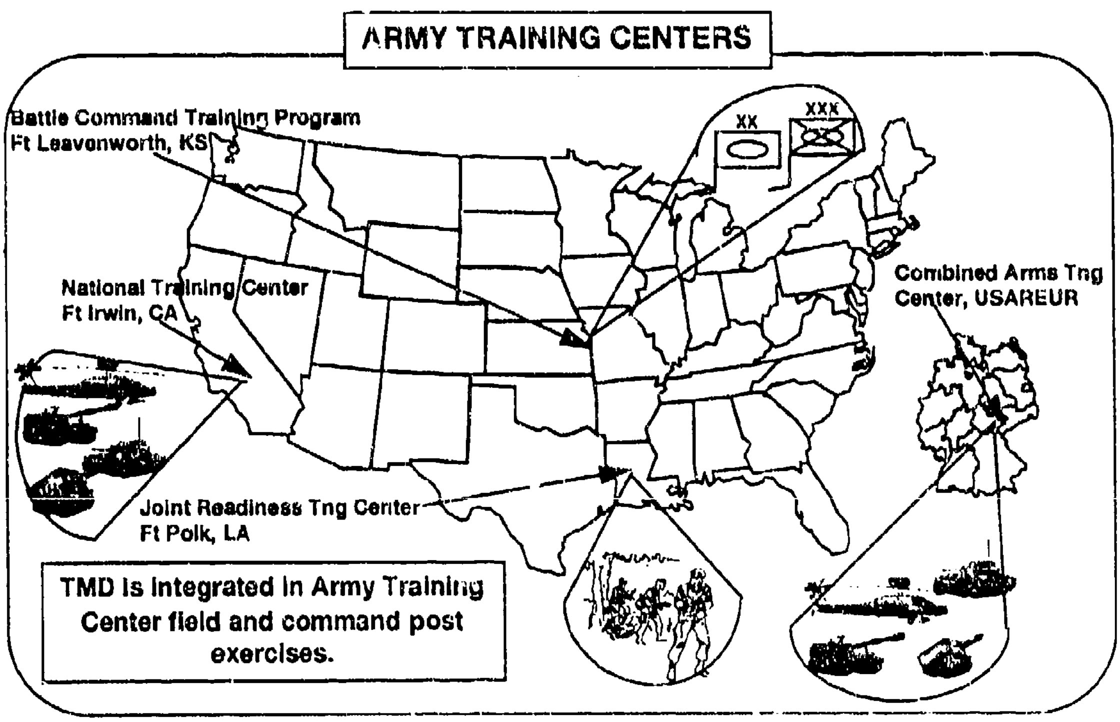


Figure J-24

The Army's Battle Command Training Program (BCTP) command post exercises (CPX) provide division and corps commanders and their staffs the same realistic intense combat training that the CTCs provide maneuver units. Similarly, TMD operational elements will become a higher priority as the BCTP WARFIGHTER scenarios begin to reflect increased force projection roles.

WARFIGHTER CPXs merge the real activity of brigade, division, and corps command posts in the field with computer simulated activities of higher, adjacent, subordinate, and enemy forces to create a realistic environment. As the Army expands this capability to merge the activity during large field training exercises (FTX) such as CTC rotations, with CPX and simulated activities, the ability to conduct realistic TMD training in all four operational elements will be significantly improved. In addition to providing an effective training tool, integrated, interoperable Distributed Interactive Simulation (DIS) compliant simulations will provide a realistic methodology to integrate the TMD operational elements.

The Army is the executive agent for the Ballistic Missile Defense Organization funded CINC TMD Experiments Program. Each of the participating joint commands has designed the overall scope of the experiment to determine the commands' ability to implement the four TMD operational elements in a joint and multinational environment. As a result, the joint commands and their components have refined TMD operational requirements, defined detailed TMD tactics, techniques, and procedures, and gained insight into required changes to current BM/C4I architectures to ensure adequate joint and international interoperability. Of particular note is CENTCOM's April/May 95 OPTIC COBRA experiment, which will be conducted in conjunction with ACOM's ROVING SANDS 95 exercise. OPTIC COBRA will feature U.S. Army SPACECOM's prototype automated, integrated, and interoperable Force Projection TMD TOC which will participate in a TMD Advanced Warfighting Experiment (AWE).

The ongoing Louisiana Maneuvers (LAM) program provides the opportunity to examine TMD strategies to provide detailed insights into doctrinal, organizational, training, leadership, materiel, and soldier (DOTLMS) developments required to fight the TMD battle in the 21st Century. A 1995 LAM issue concerning TMD is being processed.

This training section covers areas specific to TMD. For further information on Army-wide training initiatives and issues, or for a detailed explanation of fielding and funding status, please consult Annex R (Training).

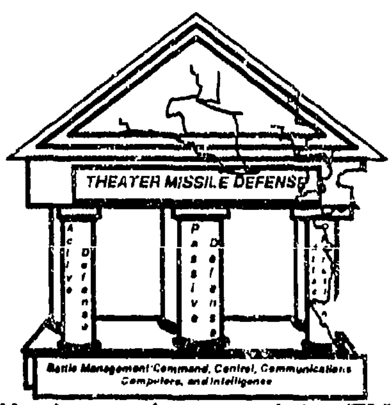
SECTION 6

CONCLUSION

The Iraqi use of SCUD missiles during the 1991 Gulf War demonstrated the grave threat posed by theater missiles. Their use against the civilian populations in Saudi Arabia and Israel caused widespread fear and a diplomatic reaction that had the potential to split the U.S. led coalition and required the CINC to divert considerable reconnaissance, surveillance, and air/fire support resources to an ad hoc TMD campaign. In addition, it was a SCUD attack on logistics facilities in the rear area that caused the highest number of U.S. casualties in any single incident during the war. One of the most disquieting aspects of the Gulf War experience was the effect of Iraqi SCUDS, even though they were not used to deliver weapons of mass destruction. As discussed in this annex, the threat is more severe now than in 1991, and is expected to grow in severity throughout the decade. Thus the Army considers theater missiles and UAVs to be major obstacles to successful force projection operations, during both Operations Other Than War and combat.

The Army has developed a TMD program to protect U.S. and multinational forces and critical assets from theater missiles and UAVs by neutralizing, disrupting, and destroying the enemy's theater missile capability. The program groups capabilities being developed to support the Army's traditional battlefield functional areas into the Passive Defense, Attack Operations, Active Defense, and BM/C4I operational elements and focuses them on the TMD problem.

Integrated Structure



Weakness in any of the TMD Operational Areas affect the entire program

Figure J-25

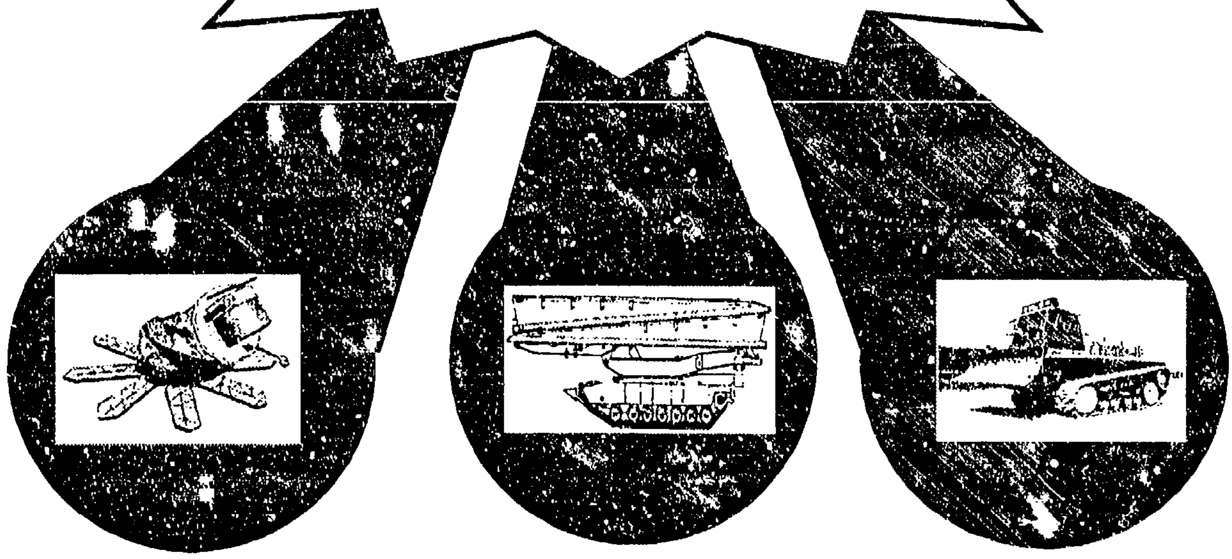
In 1993, the Army's modernization plan grouped required TMD capabilities into the four operational elements, and based upon weaknesses in Passive Defense and Attack operations, assessed overall TMD capability as **RED** in the near-term and **AMBER** in the mid- and far-terms. This modernization plan assesses TMD capability as **AMBER** in the near- and mid-terms and **GREEN** in the far-term. The current assessment is significantly more optimistic than the 1993 assessment and reflects the progress made during two years of integration and modernization effort in response to the theater missile threat.

However, the Army TMD program is an integrated capability that capitalizes on the strengths found throughout the operational elements to destroy, disrupt, and neutralize hostile theater missile and UAV capabilities. Conversely, weaknesses in any of the operational elements adversely affects the overall TMD program. The optimistic TMD assessment in this plan is valid only if planned modernization activities continue across all operational elements.

ANNEX K

ENGINEER AND MINE WARFARE

"Engineers...provide the resources and direct actions which allow commanders to dominate the battlefield."



ANNEX K

ENGINEER & MINE WARFARE

SECTION 1

INTRODUCTION

As envisioned in the Army's Force XXI concept, the Army of the future depends on engineers to achieve its tactical, operational, and strategic objectives. The redesign of the operational and institutional pieces of the Army must include its engineer forces and equipment. This annex will describe what is being done to move Army engineers into the era of Force XXI.

Future military operations of the United States will continue to rely on jointness. The continuum of conflict will range from peacetime engagement to major regional conflict. Combat in the future will be characterized by early entry operations, extended battle space, and deep and simultaneous attacks throughout the battle space, all directed by battle command systems that digitally link the forces on the battlefield.

Engineers are valued members of the Army combined arms team. Their responsibilities to the Army are numerous. Combat engineers in forward areas give maneuver forces the ability to cross gaps and breach minefields and obstacles as well as create obstacles to hinder the movement of enemy forces. Engineers in rear areas maintain lines of communications, construct airfields and ports, and build base support facilities. Topographic engineers provide all services and unified commands the topographic products required to plan and execute operations.

Army engineers are an integral part of the combined arms team, for war and operations other than war (OOTW). Engineer capability means preparedness. Preparedness means modernization. Likewise, Army engineers must possess a number of capabilities to fulfill the range of roles they are assigned. These capabilities are a function of modernization. The Army Modernization Strategy calls upon engineers to:

- **Project and Sustain.** Engineers are critical to strategic deployment capabilities. Engineers construct, reconstruct, rehabilitate, and improve airfields, ports, and supply/lodgment areas--the early entry points of Force Projection elements. Moreover, expanding and sustaining forces--joint and multi-national--call for engineers to construct facilities, upgrade and maintain lines of communications, and improve lodgment areas.

• **Protect the Force.** Engineers construct structures to protect critical command and control locations and systems, weapons systems, and logistics nodes by camouflage, concealment, and bunkerage throughout the depth of the battle space. The capabilities to Protect the Force are gaining importance due to the increasing multi-spectral threat and the proliferation of high-technology/improved weapons throughout the under-developed regions of the world.

• **Win the Information War.** Engineers are a part of the digitized battlefield. New mobility systems will have imbedded digital systems to track locations and pass information. Maps and 3-D terrain visualization products must either be available or rapidly generated to provide decision-making support to commanders involved in both contingency and deliberate operations. Engineer topographic systems provide tailored products when required, are able to manipulate terrain data, and distribute terrain data electronically to all elements of the deployed force.

• **Conduct Precision Strikes.** Accurate electronic map background displays that show the precise location data of both the target and the shooter are critical to successful maneuvers and fires. Digitization technology, embedded in combat engineer mobility systems, facilitates rapid engagement of threat forces.

• **Dominate the Maneuver Battle.** Engineers assist significantly in the domination of the expanded battle space. The evolution of engineer smart munitions produces both intelligent minefield technology and systems that sense and destroy enemy armored formations throughout the depth of the battlefield. Engineer capabilities enhance the tactical mobility of our maneuver forces while impeding the mobility of threat forces. The priorities of engineer force modernization center on the engineer systems that support domination of the maneuver battle: the M1 Breacher, the Heavy Assault Bridge, the Wide Area Munition, standoff minefield detection, Heavy Dry Support Bridge, and standoff minefield breaching.

The engineer's traditional roles, missions, and required capabilities remain unchanged into the 21st Century. Although the Engineer Restructuring Initiative improved engineer C2; retained combat engineer capability for mobility, countermobility, and survivability within divisions; and shifted sustainment engineering to echelons above division, engineer equipment modernization programs lag behind the combat forces in the near-and mid-terms.

Furthermore, fielding schedules and research and development for nearly all engineer systems are now longer. Consequently, the focus of engineer modernization is to field technological matching systems to Force Packages 1 and 2 units wherever possible. Current programs still have mission shortfalls that must be resolved in the future. Among the shortfalls are: tactical and support bridging, demolitions, and countermine systems. Currently, the systems used to perform such missions are antiquated. As a result, Army commanders face gross deficiencies in mobility and countermobility support. These, in turn, subject our forces to unacceptable risks.

SECTION 2

WARFIGHTING CONCEPT

INTRODUCTION

The engagements of engineers in future military operations will be diverse and demanding. Army engineers will engage in OOTW, in contingencies to reinforce deterrence, and in major regional conflicts. Engineers will contribute to the battle dynamics of Force XXI operations by protecting and supporting early deploying forces, by supporting forces to gain dominance of extended battle space, by supporting forces in their execution of attacks, by sustaining forces, and by being integral participants in the architecture of battle command. Throughout the continuum of conflict engineers execute their missions of mobility, countermobility, survivability, sustainment engineering, and topographic engineering.

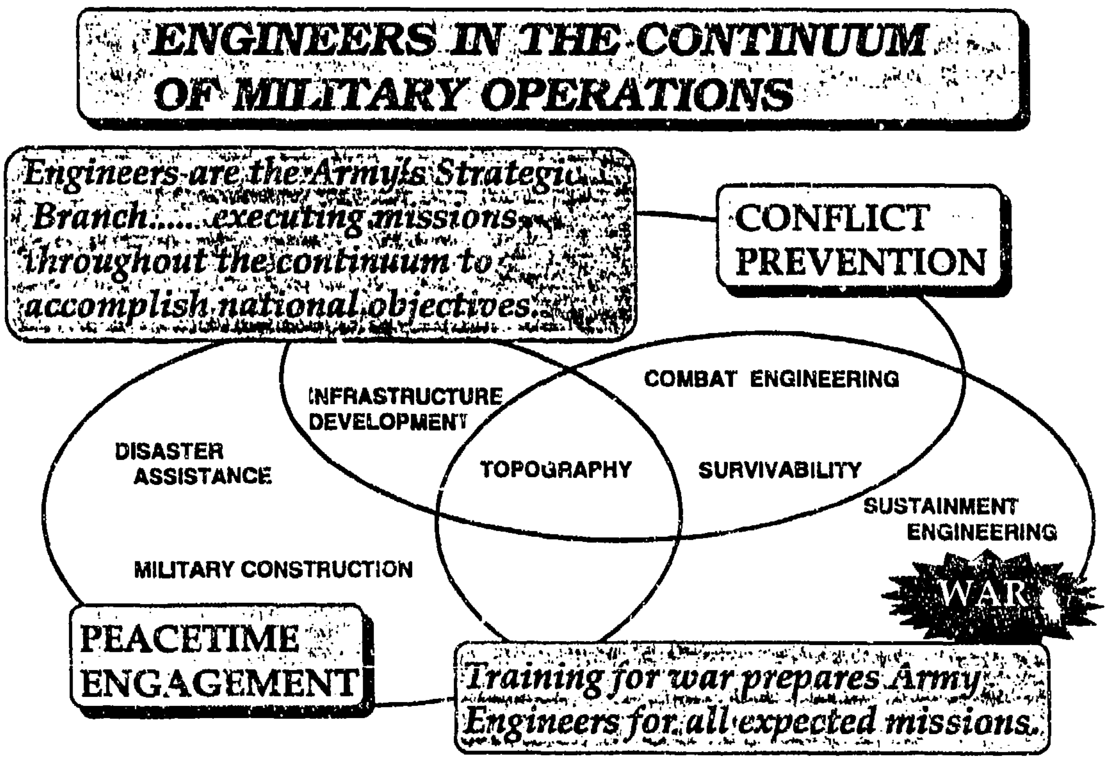


Figure K-1

PEACETIME ENGAGEMENT

Army engineers of Force XXI engage, around the world, in a variety of Army missions that promote peace and influence developing nations. Engineers have mobility, countermobility, sustainment, and topographic responsibilities to support missions such as nation-assistance, infrastructure development, facilities management, and disaster relief operations. Engineer units are typically among the first to deploy in support of disaster relief operations. Also, engineers have performed, and continue to perform key roles in counterdrug operations. Finally, and most importantly, engineers continue to train as part of the Army's combined arms team.

CONFLICT PREVENTION

Effective conflict prevention, or deterrence, requires the demonstration of will and capability to resort to conflict. During situations of increased tension or crisis, Army engineers engage in countermine, demolition, survivability support, barrier construction, and other build-up missions to demonstrate the will and resolve of U.S. forces. Moreover, engineers perform sustainment missions--maintain LOCs, and provide and protect facilities and forces engaged in the crisis area. Also, engineers provide accurate and timely topographic products using current technology and various data sources. Army engineer topographers provide up-to-date maps and terrain visualization models which allow commanders to plan and execute deterrence operations in areas of the world possessing poor or non-existent map coverage.

WAR

In war, engineers, like no other battlefield component, provide the resources and direct actions which allow commanders to dominate the extended battle space.

Engineers maintain the mobility of the maneuver force throughout the depth of the battlefield with new systems such as the M1 Breacher, the Heavy Assault Bridge (HAB), the Heavy Dry Support Bridge (HDSB), the Improved Ribbon Bridge (IRB), vehicle mounted mine detection systems, and the Close-In Manportable Minefield Detection System (CIMMD). Engineers also contribute to deep battle operations by employing standoff minefield detection systems, such as the Airborne Standoff Minefield Detection System (ASTAMIDS) and the Wide Area Munition (WAM).

M1 BREACHER

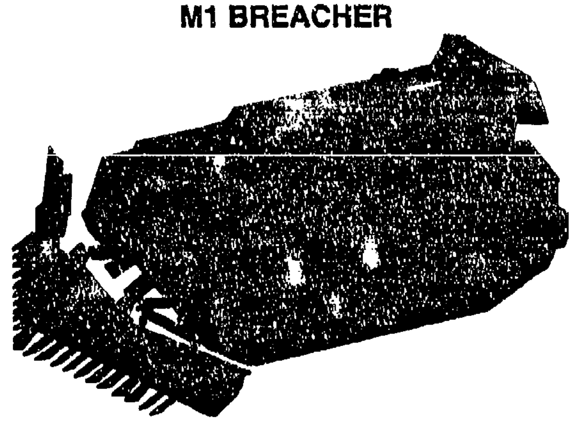


Figure K-2

Countermobility is a major engineer mission in wartime. The VOLCANO, a scatterable mine system that is organic to all combat engineer units, will be the primary munition for mine warfare, and is supplemented by our aging inventory of conventional "dumb" mines. The Modular Pack Mine System (MOPMS), provides combat engineers, infantry, and other selected combat arms units a close-in protective mining capability which is employable on short notice and recoverable if not detonated. Also, engineer countermobility is applied to deep operations and throughout the battle space depth by deployment of the Wide Area Munition (WAM). WAM is a smart munition with a long-term, loitering, anti-armor capability. As technology allows and newer systems are fielded, WAM provides the basis for the Intelligent Minefield (IMF), a revolutionary technology, that permits minefields to detect enemy armor formations, to report them via digitized data links, and either to immediately engage the targets with a top-attack munition, or to delay the attack until an optimal target array presents itself inside of the IMF.

Wide Area Munition

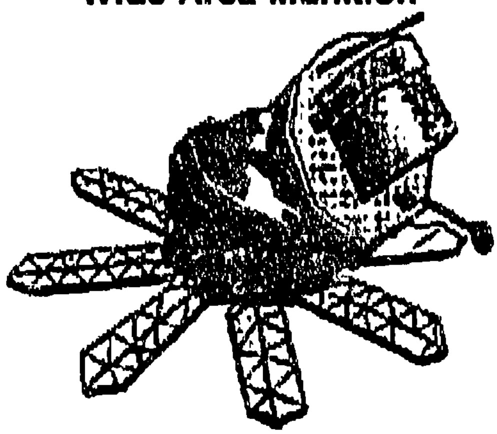


Figure K-3

Engineers contribute to the Force Projection, sustainment, and survivability of an Army or joint force. During early entry operations, Army engineers perform key roles in the U.S strategic deployment system. Key engineering roles include: constructing or repairing seaports to accommodate the roll-on/roll-off (RORO) ship fleet; supporting logistics-over-the-shore (LOTS) operations; constructing, repairing, or rehabilitating strategic airfields to accommodate C-17/ C5/ C-141 aircraft of the nation's civil reserve air fleet; constructing, repairing, and maintaining roads; constructing, repairing, or rehabilitating operational airfields to accommodate intra-theater airlift and rotary wing aircraft; and, constructing infrastructure facilities which allow joint forces to perform continuous operations and sustainment.

Engineer equipment systems also provide the survivability positions required by deployed forces. However, survivability remains a challenge to engineers. The engineers' aging construction equipment fleet, which averages 20 years, is required for warfare at the strategic, operational, and tactical levels of war. Unfortunately, the capability of the construction equipment fleet is at risk due to inadequate funding of programs designed to replace or upgrade current systems.

Engineers provide the topographic information and products needed. Engineers support Force Projection/early entry operations by performing terrain reconnaissance through observation, digital terrain data, and exploitation of multi-spectral imagery. Winning the information battle demands that engineers provide the baseline reality for all information. This requires precise, up-to-date knowledge of the terrain and the effects terrain has on both friendly and threat forces. The new Combat Terrain Information System (CTIS), composed of the Digital Topographic Support System (DTSS) and the Quick Response Multicolor Printer (QRMP), provides operational and tactical level commanders with specialized hard copy terrain products. These systems are important to future operations. They permit commanders and staffs to "see" the operations area in 3-D prior to deployment, as well as providing updated map products, developed from current multi-spectral imagery for planning and operations before deployment and after employment. These systems constitute the move toward terrain data digitization and terrain visualization via computer technology. Then, the next step is the capability to feed real-time terrain observations into command and control systems via digital links.

SECTION 3

CURRENT PROGRAM ASSESSMENT

The Army's capabilities to execute the Engineer and Mine Warfare program during the near- (FY 95-96), mid- (FY 97-00), and far-terms (FY 01-09) are assessed here. The program to modernize the engineer force is based on the engineer mission areas:

- **Mobility** - Enhance friendly freedom of maneuver by providing countermine/counterobstacle capability, conducting gap/river crossings, constructing combat roads/trails, and performing forward aviation combat engineering (FACE);

- **Countermobility** - Impede enemy freedom of maneuver by enhancing battle space with obstacles and mines;

- **Survivability** - Reduce friendly force vulnerability through rapid construction of fighting positions, protective emplacements, and camouflage/ concealment;

- **Sustainment Engineering** - Support Force Projection by maintaining, upgrading, or constructing lines of communications and facilities, area damage control, and producing construction materials;
and,

- **Topographic Engineering** - Provide commanders terrain analysis and topographic products that allow them to use terrain most effectively.

ASSESSMENT AND MODERNIZATION FIX

Within each mission area, deficiencies and improvements to the current Program Objective Memorandum (POM) are identified in this section. Each is also rated:

RED- No capability exists or, is insufficient to defeat the threat or provide the required support;

AMBER- A limited capability or quantity exists to perform the mission; and,

GREEN- Adequate capability or quantity exists to perform the mission.

MOBILITY

At present, mobility systems cannot support maneuver forces. Moreover, support to heavy force maneuverability cannot be adequately accomplished. Development and fielding of engineer mobility equipment has not kept pace with the modernization of armor, mechanized infantry, and self-propelled artillery units. Current capabilities can only support gap crossings for military load class 70 traffic under caution conditions. With respect to the anticipated proliferation of high-technology mines around the world (Figure K-4), countermine capability must be aggressively improved. Current capability relies on the hand-held mine detector or the mine probe. Therefore, countermine capability is severely restricted by the lack of a stand off mine detection system.

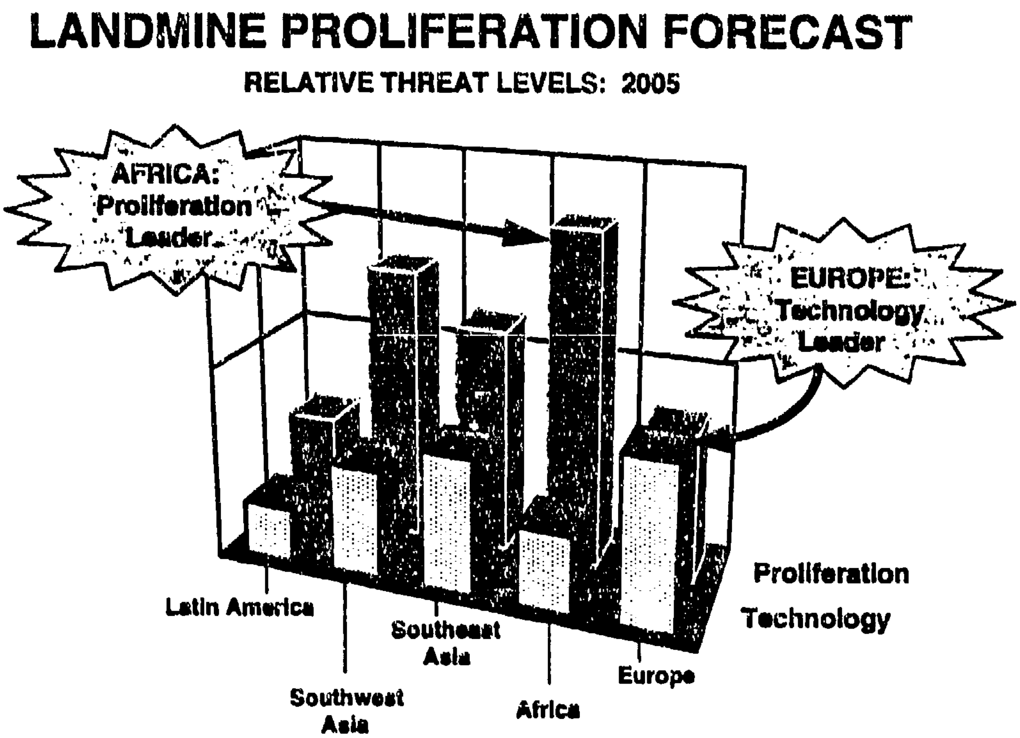


Figure K-4

Countermine / Counter Obstacle

• **Detection:** **RED** in the near-term. We have only the hand-held mine probes and AN/PSS-11 and -12 mine detectors. These do not detect non-metallic components of mines. Our combat vehicle-mounted mine roller is ineffective against double-impulse, magnetic fused, and standoff mines. **AMBER** in the mid-to-far terms due to fielding the Aerial Standoff Minefield Detection System (ASTAMID), the Interim Vehicle Mounted Mine Detector (IVMMD), and the Close-In Manportable Mine Detection System (CIMMD).

• **Breaching: RED** in the near-term. No systems are fielded in the near-term. Deletion of countermine capabilities to defeat magnetic mines reduces versatility and flexibility of our combined arms maneuver force. Lack of funding for the Marine Corps-procured Anti-Personnel Obstacle Breaching System (APOBS) places light forces at risk in the conduct of minefield breaching. **AMBER** in the mid-to-far-terms. The M1 Breacher is insufficient in number, and its fielding is too slow.

• **Marking: RED** through the far-term. The current hand-emplaced system is slow and does not support high tempo operations which are characteristic of modern maneuver forces. There is no anticipated funding for an assault breach marking system.

• **Clearing: AMBER** through the far-term. In the near-term, the tank-mounted mine roller and mine plow provide the only in-stride breaching/clearing capability; these items of equipment are unreliable and subject to breaking. Although the M1 Breacher will provide a much more capable system, it will be fielded in low quantities through the far-term.

MOBILITY ASSESSMENT MATRIX

MISSION AREA	NEAR-TERM 95-96	MID-TERM 97-00	FAR-TERM 01-09	COMMENTS
Countermine/counterobstacle				
Detection	RED	AMBER	AMBER	Standoff systems fielded mid to far
Breaching	RED	AMBER	AMBER	Breacher is critical; too few fielded
Marking	RED	RED	RED	No funds for assault breach marking system
Clearing	AMBER	AMBER	AMBER	Dismounted capability only
Gap Crossing				
Assault Gap Crossing	RED	AMBER	AMBER	Too few HAB/AVLB 70 fielded
Bridging	RED	RED	AMBER	IRB and HDSB low funding
Combat Roads&Trails/FACE	AMBER	AMBER	AMBER	Aging construction equipment

Figure K-5

Gap Crossing

• **Assault Gap Crossing: RED** in the near-term: The current Armored Vehicle Launched Bridge (AVLB) is Military Load Class (MLC) 60 and can support the Abrams tank fleet only under "caution" conditions using low speeds over a reduced span length of 50 feet. **AMBER** in the mid-and far-terms. This rating is due to fielding the Heavy Assault Bridge (HAB) and improvements to the AVLB. A portion of the AVLB fleet will be upgraded by improving the bridge to permit crossings of up to MLC 70 under normal conditions. Fielding of the HAB begins in the mid-term, but in low quantities.

• **Bridging: RED** through the mid-term. Current fixed bridge systems (M4T6, Medium Girder Bridge, and Bailey Bridge) were designed for the M60 tank, not the M1 tank. They are over two decades old and restrict mobility (maximum MLC 60). The current floating bridge system, the Ribbon Bridge, is vulnerable to small arms fire and lacks the mobility of the supported force. **AMBER** in the far-term. Fielding the Heavy Dry Support Bridge (HDSB), the Improved Ribbon Bridge (IRB), and the Improved Common Bridge Transporter (ICBT) greatly increases engineer force capabilities. However, quantities are low and fielding occurs over an extended period through the far-term.

HEAVY ASSAULT BRIDGE

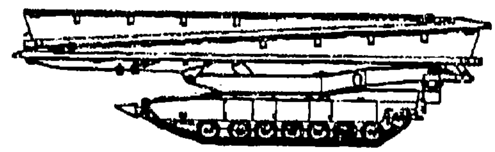


Figure K-6

Heavy Dry Support Bridge

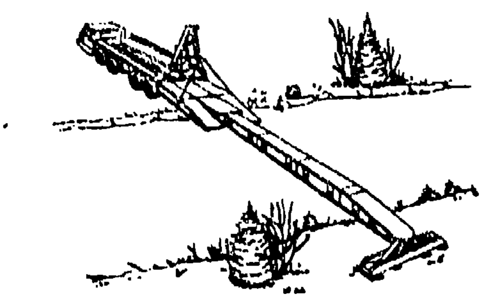


Figure K-7

• **Combat Roads and Trails / Forward Aviation Combat Engineering (FACE). AMBER** through the far-term. Capability improves for light engineer forces with the fielding of the Deployable Engineer Universal Combat Earthmover (DEUCE). The DEUCE provides a self-propelled dozing capability that replaces the current dozer-tractor-trailer combination and thus enhances mobility of light forces in the mid-term. However, this mission area is at risk due to two primary reasons: the current average age of the engineer construction equipment fleet --20 years-- and the lack of a robust replacement and/or rebuild program through the far-term.

MOBILITY & COUNTERMOBILITY FIELDING

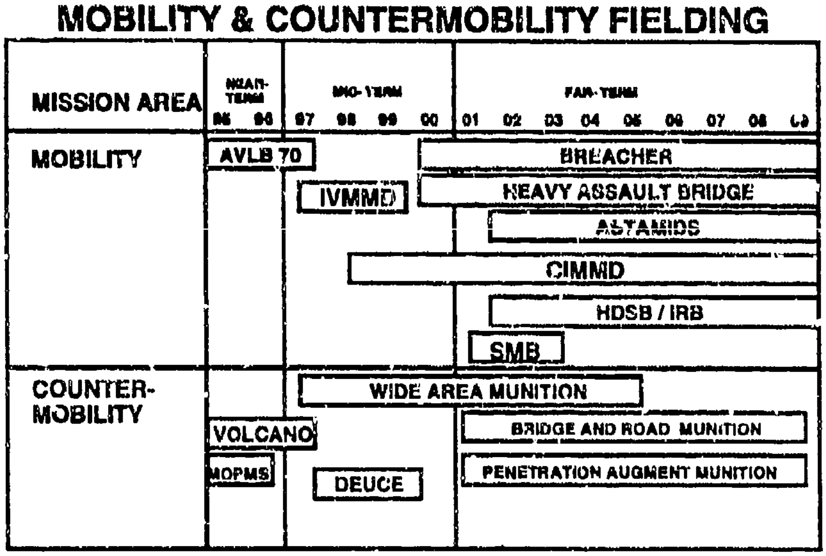


Figure K-8

COUNTERMOBILITY

Mine Warfare

• **Scatterable. AMBER** through the far-term. Artillery delivered mines are fielded worldwide but in limited numbers. Engineer emplaced scatterable mine systems are being fielded but also in limited numbers. VOLCANO system fielding is completed in the mid-term. However, reduced procurement of VOLCANO Class V results in a reduced reload capacity for Force Package 1 units; this, in turn, increases risk during Force Projection/early entry operations. The Modular Pack Mine System (MOPMS) is fielded but in limited quantities. The ability of engineer forces to sustain two MRCs through the far-term is at risk because of a lack of future funding for these ammunition items.

• **Smart.** The mine warfare mission area has smart categories including development and procurement of the Wide Area Munition (WAM) and the Command and Control (C2) WAM, which is the precursor to the Intelligent Minefield. Some maneuver forces will not be able to **quickly** employ tactical minefields in offensive and defensive operations. Following Special Operations Command initial procurement, the Army is considering actions to procure the Selectable Lightweight Attack Munition (SLAM). The SLAM, due to its lethality and small size and weight, would provide a significant degree of immediate anti-armor/anti-vehicular capability in any airhead/bridgehead that parachute assault, helicopter assault, or amphibious assault forces would seize and secure. Due to limited procurement quantities of the WAM and the lack of funding for SLAM, this area is **AMBER** through the far-term.

• **Conventional.** A requirement remains for conventional mines and minefields which do not self-destruct and can remain in place for long periods of time. This area is **AMBER** through the far-term. Much of the large inventory of conventional anti-tank and anti-personnel mines dates from the 1950's and has deteriorated. These mines exist in large enough quantities to meet mission requirements. However, they are stored principally in the U.S. and Europe and must be transported to where they are needed. Most are metal-based, easy to detect, and time, manpower, and logistically intensive to position. NBC and adverse climatic conditions do not affect their performance. Improved fuzes capable of full-width attack, possessing higher countermeasure resistance, are fielded in the mid-term, but in quantities too low to affect the **AMBER** rating. There will be no funding in the foreseeable future to upgrade or replace these conventional mines.

All conventional mines, especially anti-personnel mines, are subject to use restrictions from two pending international agreements: the Certain Conventional Weapons Convention and the Anti-personnel Landmine Control Regime.

COUNTERMOBILITY ASSESSMENT MATRIX

MISSION AREA	NEAR-TERM 95-96	MID-TERM 97-00	FAR-TERM 01-09	COMMENTS
Mine Warfare				
Scatterable	AMBER	AMBER	AMBER	Limited Production, Class V
Smart	AMBER	AMBER	AMBER	Limited Production, Class V
Conventional	AMBER	AMBER	AMBER	Deteriorating Stock/Logistic Burden
Obstacle Development				
Explosive Obstacles	RED	RED	RED	Current Stocks: Time & Labor Intensive, Obsolete,
Non-Explosive Obstacles	AMBER	AMBER	AMBER	Tied to Equipment Fleet

Figure K-9

Obstacle Development. A requirement exists to rapidly emplace obstacles on the battlefield by either explosive or non-explosive means.

- **Explosive Obstacles.** This area is rated **RED** in the near-and mid-terms. A lir ed capability exists for bridge demolition, but only by using time and labor intensive V -era techniques, which would expose troops to small arms and artillery fire. The E ge and Road Munition (BRM) could alleviate this shortfall, but only limited quantities may be available. Currently neither an effective tunnel demolition technique nor a special munition exists for this purpose. The Penetration Augmentation Munition (PAM) is fielded in the mid-term to demolish dams and tunnels, and to create expedient obstacles. The primary capability for cratering roads and airfields remains the manpower and time intensive 40-lb shaped charge and 40-lb cratering charge, but both under most circumstances are highly ineffective against most modern pavements when rapid results are necessary. Due to the time-intensive demands of the shaped and cratering charges, they impede last-minute movement by friendly forces, thereby degrading the engineers' ability to support maneuver operations. The M180 Cratering Demolition Kit is hazardous to use and has been removed from the inventory. Current firing devices and anti-handling systems have been around since WWII with most on-hand stocks dating from the 1950s and '60s. The current firing systems for demolitions are manpower and time-intensive. The Modernized Demolition Initiator (MDI), due for fielding in the near-term, is an easy-to-use EMP/RFI-proof initiator which is available only in limited numbers. As our current stock of explosive devices ages even further, and becomes even more obsolete, this area will remain **RED** in the far-term.

- **Non-Explosive Obstacles.** The demand for non-explosive obstacles continues well into the 21st Century. Examples of nonexplosive obstacles include log

cribs, antitank/antivehicular ditches, wire obstacles, tetrahedrons, abatis, and falling blocks. Emplacement of these obstacles requires extensive Class IV categorizing and, in most cases, using engineer construction equipment which is organic to combat engineer units. This area is **AMBER** in the near-through far-terms due to increased burdens on logistics resources to procure, maintain, and move Class IV barrier materials; the 20-year age of our engineer equipment fleet; and the slow or non-existent future replacement and/or upgrade programs.

SURVIVABILITY

Camouflage and Concealment. Visual observation is one means of battlefield detection. Modern sensors, however, can detect man-made objects and terrain disturbances unseen by the unaided eye. This area is rated **AMBER** in the near- and mid-terms. In the near-term, our current lightweight camouflage screening systems fail to provide protection against some of the newer sensors. Currently, our vehicles and equipment have patterned camouflage paint schemes and use standard screen systems, but neither of these camouflage methods are effective when vehicles or equipment move. The rating remains **AMBER** through the mid-term. The Multi-Spectral Camouflage System (MSCS), and the Ultra-Lightweight Camouflage Netting System (ULCANS), fielded in the far-term, coupled with our current systems, will raise this area to **GREEN.**

Survivability Assessment Matrix

MISSION AREA	NEAR-TERM 95-96	MID-TERM 97-00	FAR-TERM 01-09	COMMENTS
Camouflage & Concealment	AMBER	AMBER	GREEN	MSCS and ULCANS
Fortifications				
Individual	AMBER	AMBER	AMBER	SFC/FPE Unfunded
Vehicle	AMBER	AMBER	AMBER	ACE SIPs/DEUCE
Shelters	AMBER	AMBER	AMBER	HYEX unfunded
Decontamination Support	RED	RED	RED	Equipment and Training
Support to Deception Operations	AMBER	AMBER	AMBER	Tied to Equipment Fleet

Figure K-10

Moreover, current packaging materials are not painted or colored with earth tones. Screening systems and tarps provide some visual protection, but they do not conceal field supply points and tactical logistics activities-- most of which occur in generally open terrain. Finding terrain features which afford protection for forward logistics activities is a challenge because such activities are at risk when they are not protected from observation.

Fortifications. Various fortifications continue to be needed on the battlefield in the future.

- **Individual.** This area is **AMBER** through the far-term. Engineer support to supplement soldiers' efforts is currently limited to the Small Emplacement Excavator (SEE). Development in three systems is underway to provide a Fighting Position Excavator (FPE)-- which is a mechanical and/or explosive device used by individuals to create two-soldier fighting positions: a lightweight Soldier Fighting Cover (SFC), and a Fighting Position Revetment Kit (FPR Kit).

- **Vehicle.** This area remains **AMBER** through the far-term. Although a selected improvement program for the M9 ACE is underway, and the Deployable Universal Combat Earthmover (DEUCE) is fielded in the near-term, there will not be enough excavators to dig the required numbers of positions for all types of vehicles.

- **Shelters.** This area remains **AMBER** through the far-term due to dependence on the availability and age of engineer construction equipment as well as the availability of Class IV material. Construction of shelters in forward areas competes with vehicle and soldier protection based on maneuver commanders' priorities and threats on the battlefield.

Decontamination Support. This area remains **RED** through the far-term. Engineer equipment does not afford operator/crew protection when clearing hazardous materials. In general, engineer equipment tends to spread contaminants since only scrapers are capable of removing contaminated soil.

Deception. Engineers support deception operations by constructing false positions, decoys, and protective structures and by emplacing phony minefields and barriers. Engineer support to deception operations depends largely on the availability and condition of engineer construction equipment. This area is **AMBER** through the far-term because this construction equipment is in poor condition--principally due to age-- and quantities are insufficient.

SURVIVABILITY, SUSTAINMENT, AND TOPOGRAPHY FIELDING

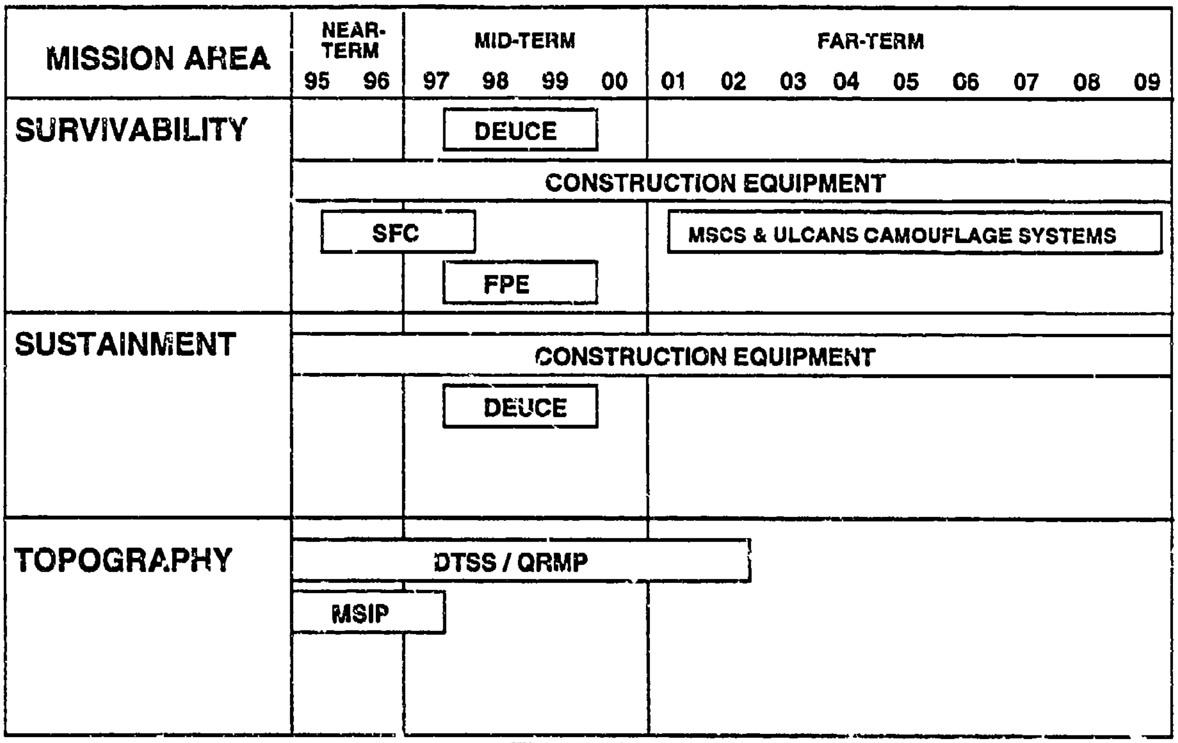


Figure K-11

SUSTAINMENT ENGINEERING. Rated **AMBER** in the near-and mid-terms **RED** in the far-term. Army engineers contribute significantly to U.S. defense strategy. Engineer support to Force Projection operations is crucial to the success of strategic deployment. Engineer forces are required to maintain, rehabilitate, and upgrade selected strategic APODs and SPODs through which projected forces flow. Engineer forces also maintain intratheater lines of communications and build and maintain facilities required to expand and sustain forces. Since the average age of our construction equipment fleet exceeds 20 years, the desired replacement program would exceed over $2 billion through the far-term; unfortunately, we expect to receive less than one-eighth that amount. Consequently, by the beginning of the 21st Century, Force Projection operations and the establishment of lodgment areas and sustainment facilities could become at risk due to antiquated equipment and an inadequately funded replacement/upgrade program.

SUSTAINMENT & TOPOGRAPHY ASSESSMENT MATRIX

MISSION AREA	NEAR-TERM 95-96	MID-TERM 97-00	FAR-TERM 01-09	COMMENTS
SUSTAINMENT				
Construction Equipment	AMBER	AMBER	RED	Aging Construction Equipment
TOPOGRAPHIC				
Strategic	AMBER	RED	RED	No funds for TSS upgrade/Future
Operational	AMBER	AMBER	GREEN	
Tactical	AMBER	AMBER	GREEN	

Figure K-12

TOPOGRAPHIC ENGINEERING. Missions are now categorized Strategic, Operational, and Tactical due to recent doctrinal changes emerging from the US Army Engineer School. The pace of technological developments and the acquisition of off-the-shelf systems herald a bright future for military topography.

• **Strategic.** This area, however, is **AMBER** in the near-term and **RED** in the mid-and far-terms. The insufficiency of Defense Mapping Agency (DMA) map production and digital terrain data are the primary reasons for these ratings. Digital terrain and elevation data is currently available for only 66% of the earth's surface; consequently, tactical mapping of much of the areas where U.S. military forces can expect to be deployed is largely unavailable. The DMA is working to overcome the digital data and map production deficiencies by the far-term; however; priority by the Army is being given to 1:250,000 scale joint operations graphics. Moreover, the Army funds have not been allocated to upgrade the topographic support systems (TSS) in topographic engineer companies. Current TSS equipment was fielded in the late 1980's and will require extensive improvements or replacement to keep pace with technological advances.

• **Operational and Tactical.** Improvements in these areas provide marked increases in multi-spectral imaging capability for topographic engineers and terrain analysts at Corps and division levels. However, these areas are **AMBER** through the near-and mid-terms and **GREEN** in the far-term. Near-term improvements include fielding of seven Digital Topographic Support Systems (DTSS) mounted on 5-ton trucks, and the procurement of Multi-Spectral Image Processors (MSIP) for all topographic units. In the mid-term, a combined DTSS/ QRMP (Quick Response Multicolor Printer) system is fielded in shelters designed for the HWMMV. Still, these systems may become obsolete because programmed improvements are not funded through the far-term.

SUMMARY

Today's engineer force relies on aging, difficult to maintain systems that are insufficient to support heavy maneuver force operations in two MRCs. The modernization gap among the combat functions of maneuver and mobility/survivability is extremely wide today and continues to increase. The modernization strategy and the adjustments outlined here provide marginal improvement. The procurement of the HAB, M1 Breacher, ASTAMIDS, WAM, DEUCE, and digital topographic capability provides the framework to develop a more responsive, efficient, and flexible engineer force. Figure K-13 shows that funds programmed are insufficient to achieve an overall rating better than **AMBER**.

FUNDING (IN $, MILLIONS) FOR ENGINEER & MINE WARFARE THROUGH NEAR & MID TERMS

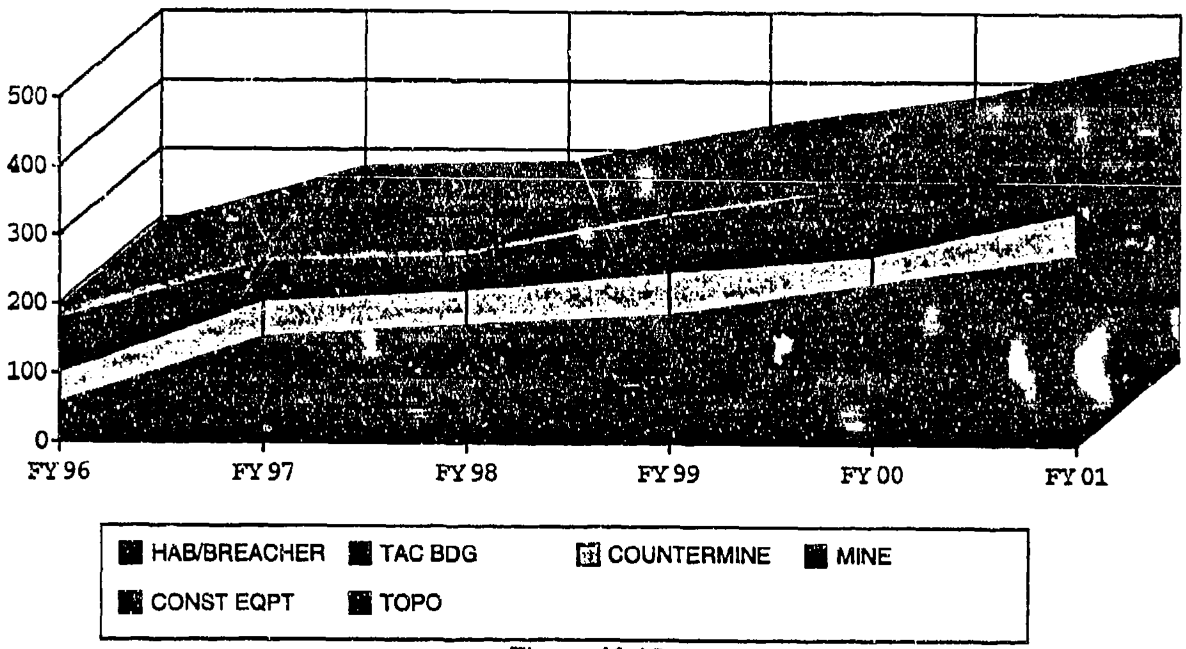


Figure K-13

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

RESEARCH AND DEVELOPMENT

Engineer Science and Technology Program. Science and Technology (S&T) initiatives focus on leveraging current technologies and maturing others for insertion in existing systems to improve operational capabilities and correct deficiencies. The demolition technology base has not continued into the new program. The current demolitions programs and technologies recognize an acceptable risk, but future developments have not been funded at this time.

SCIENCE AND TECHNOLOGY OBJECTIVES (STO):

Mobility and Countermobility.

- **Mine Hunter Killer** demonstrates an infra-red detection scheme on a combat vehicle which applies a mounted forward looking microwave detection device in FY 96 and a brassboard directed energy/explosive neutralizer in FY 98. By the end of FY 99; these are then integrated into a single system capable of detecting and killing mines at a standoff range.

- **Rapid Obstacle Creation** demonstrates by the end of FY 96 the technology to effectively plan and execute countermobility missions within the maneuver commander's decision window while reducing time, manpower, and explosives. By FY 97, this program provides software packages that evaluate the effect of different countermobility operations.

Sustainment and Survivability

- **Construction Materials and Methods** provides the capability for rapid construction and repair of in-theater transportation and facilities infrastructure to sustain a deployed force with limited engineer resources. By the end of FY 95, this program develops methods to stabilize dry soils. By the end of FY 97, the program provides the technology to affect soft soils; and by the end of FY 98, the program develops models for engineering in cold regions.

- **Field Fortifications** develops by FY 95 technology required for expedient protective systems that reduce manpower, material, and logistic requirements for survivability missions for brigade and division C2 without sacrificing mobility. By FY 97 this program demonstrates protective structures using advanced materials.

- **Low Cost, Low Observable (LCLO) Multispectral Technology** demonstrates the capability, by FY 97, to execute and evaluate LCLO systems operating across the threat waveband so as to reduce signature and increase mobility of friendly forces on the battlefield. By FY 99, this program demonstrates a near-real-time simulation capability for scene generation and target assessment, and sets criteria for future reactive technologies.

Topographic Engineering

- **Battlefield Visualization Technologies** develops and demonstrates by FY 95 rapid 3-D battlefield visualization, dynamic terrain and environment capabilities that operate in field environments to create high resolution, geometrically correct, 3-D battlefield scenes. By FY 97, this program uses these developments in a virtual reality environment for tactical and training applications.

- **Digital Terrain Data Generation and Update Capability** develops software, special processor cards, and techniques by FY 95 to provide field commanders with the capability to update digital terrain information that the DMA provides or to develop his own, high resolution database of areas of critical interest not covered by DMA. By FY 97 this program provides the technology and capability, for tactical level topographic engineers/terrain analysts, to automatically identify terrain features.

- **Digital Topographic Data (DTD) Standardization** develops an initial software architecture for DTD input, datum transformation and coordinate conversion, display, and other common DTD applications. By FY 97 this program develops additional software which training and acquisition communities can use to validate their systems' effectiveness in the implementation of military standard DTD software.

- **Vehicle-Terrain Interaction** develops stochastic models by FY 95 to provide accurate and reliable high-resolution mobility predictions, assessments, and representations. By FY 97, this program demonstrates automated methods and completes development of theoretical models.

Hyperspectral Exploitation uses hyperspectral sensors to provide capabilities for rapid identification of targets and militarily significant manmade and natural features from remotely sensed imagery and hyperspectral data, which is especially useful for deep tactical targets and over denied areas. By FY 96, this program demonstrates computer-based identification.

Other

- **Smart Weapon Operability Enhancement (SWOE)** develops analytical infrared and basic millimeter wave models by FY 95 to emphatically simulate geographical and time/weather driven characters of environmental scenes. By FY 96, this program develops a validated multi-sensor scene generation capability to allow

quantitative consideration of environmental conditions in the design, test, and evaluation of smart weapons and automatic target recognition devices. By FY 97, this program extends the scene generation capability to encompass radio frequency band future weapon systems employed in global operations.

Proposed STOs:

- **Mission Planning** focuses on planning the missions of mobility, countermobility, and survivability for maneuver commanders with demonstrations in FY 95 of the Army Battle Command System (ABCS) common hardware and software.

- **Winter Operability Enhancement** develops techniques and capabilities, in FY 95, to control negative effects of cold temperatures, such as ice accretion, on environmentally sensitive equipment. In FY 98, the program develops capabilities to support lightweight material and improves shelter and other emerging logistical technologies in cold regions. By FY 99, the program identifies equipment most sensitive in cold regions and developmental technologies to reduce costs of equipment operating in cold regions.

ADVANCED TECHNOLOGY DEMONSTRATIONS (ATD).

- **Close-In Manportable Mine Detector ATD** demonstrates four handheld brassboards in FY 95, each using different technologies to detect metallic and nonmetallic mines. This demonstration is complete in FY 95.

- **Intelligent Minefield (IMF) ATD.** This program conducts breadboard component demonstrations in FY 95 of communication links between control stations, smart local controllers and sensors, and demonstrates common component modules which link WAM and other mines to create an IMF. In FY 96, the program initiates an integrated IMF demonstration which ends in FY 97. Acoustic sensors developed for IMF will be used in the Rapid Force Projection Initiative to enhance situational awareness and provide targeting interaction.

- **Off Route Smart Mine Clearance ATD** constructs static demonstrations in FY 95. In FY 96, the program demonstrates data collection while on-the-move in near-real-time. In FY 97, the program demonstrates limited real-time on-the-move performance.

- **Vehicular Mounted Mine Detector** demonstrates in FY 97, sensor technologies that are mounted on a ground vehicle to detect metallic and non-metallic mines.

TOP LEVEL DEMONSTRATIONS (TLD). The Army and the US Marine Corps are co-sponsoring a TLD on countermine technologies as part of Joint Capabilities Assessment initiatives. This TLD focuses on integrating countermine capabilities with

C3I linkage to maintain Army and Marine mobility, survivability, and agility. It consists of four advanced warfighting experiments:

- Expand the Lodgement (Light Forces), FY 94-95.
- Beach Breakthrough (Medium Forces), FY 95-96
- Movement to Contact (Mounted Forces), FY 96-97.
- Assault on Objective (Mounted Forces), FY 97-98.

ACQUISITION STRATEGY. Wherever possible, engineer systems are acquired by procuring already developed commercial items (Non-Developmental Items-- NDI), the products of sister services, or the products of foreign sources. When this acquisition process is not feasible, research and development is undertaken.

RDA SUMMARY MATRIX

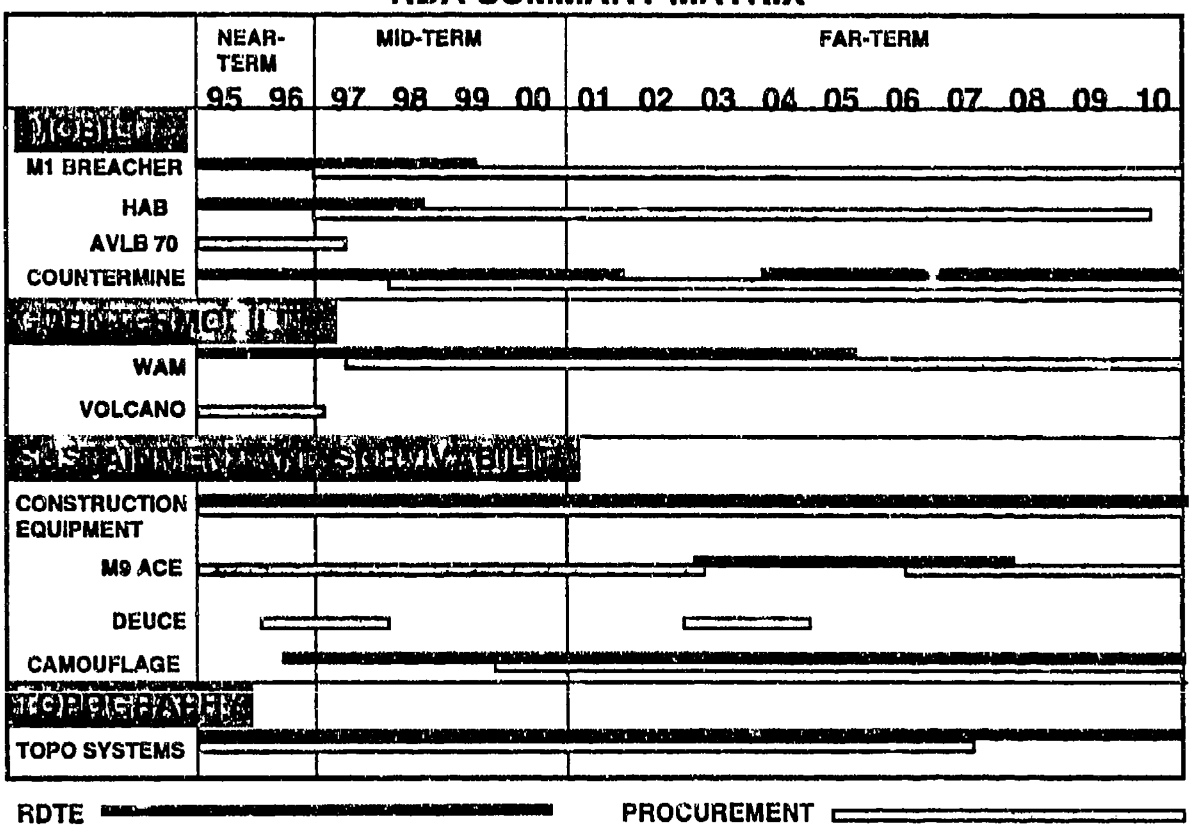


Figure K-14

SECTION 5

TRAINING

TRAINING STRATEGY

The Engineer Mission Area has consistently sought modern, state-of-the-art training simulators/devices for use by engineer soldiers and the U.S. Army. We have learned from past experience that realistic, tough training is the most effective way to prepare soldiers for the rigors of combat, and especially to prepare combat engineers for mine laying and clearing.

Modernization and its effect on training engineer soldiers and units focus on two levels: the institutional training base and collective, unit level training. Engineer soldier skills from recruit through company grade officer are taught in formal schooling. Maximum use is made of simulations, computer-supported exercises, and state-of-the-art equipment simulators. The Engineer School introduces to engineer warfighting the impacts of doctrinal development through applicable battle labs and other Louisiana Maneuver Task Force initiatives. Unit level training, supported by state-of-the-art simulators and training devices, builds on foundations established in formal training programs.

TRAINING AIDS, DEVICES, SIMULATORS, AND SIMULATIONS. Devices in development/fielding are:

- **M970 CEV 165mm Subcaliber Trainer:** This device trains main gun firing and targeting procedures on the CEV using inexpensive 40mm ammunition. Fielding to the training base terminated in FY 91 and Army-wide fielding was completed in the 1st Qtr, FY 95.

- **Mine Effects Simulator (MES):** The engineers' first MILES II interactive scatterable training mine will be used as an individual, unit, and force-on-force training device. Using a radio frequency link, it provides real-time casualty and damage assessment along with mine-peculiar audio and visual simulation. The MES can be dispensed by the GEMSS and FLIPPER dispensers or by hand. IOTE was completed 4th Qtr, FY 94. Initial fielding will be to CTCs, at a time to be determined.

- **WAM Trainer (MILES II):** This is a multi-purpose individual, unit, institutional, and force-on-force training device for the WAM. The trainer is a hardened high fidelity system which is interoperable with MILES II via radio frequency. It allows individual skill training along with real-time casualty and battle damage assessment. The WAM will be issued to CTCs and local Training Aids and Support Centers (TASC) in FY 97.

- **VOLCANO-WAM-MES:** A systems training device which takes advantage of the training technology developments for WAM, VOLCANO mine dispenser, and MES.

This combination provides a multi-purpose, reloadable training canister for use with the VOLCANO mine dispenser. The device supports individual, unit, force on force, and institutional training. First fieldings will be to CMCs and TASCs in FY 98.

• **MOPMS-MES:** This training device combines the radio frequency technology and MILES II interoperability of the MES and the M136 MOPMS trainer. This will allow training with the MOPMS systems in force-on-force environments. It will have reload capability to reduce costs. Fielding is planned in FY 98.

• **Breacher Embedded Training P3I:** A pre-planned product improvement which will allow training in simulated combat environments. The embedded training feature will be Distributed Interactive Simulation (DIS) compliant and allow interactive training with systems such as the Close Combat Tactical Trainer. This product improvement is desired but remains unfunded due to affordability.

• **Anti-Personnel Obstacle Breaching System (APOBS) Inert Trainer:** The APOBS is an individual training device which will be fielded to institutions. It is a classroom support tool for engineer, infantry, and armored cavalry soldiers. It allows them to practice the skills needed to create a footpath through an antipersonnel minefield. The Marine Corps is the proponent of this device. Fielding is scheduled for 4th Qtr, FY 95.

• **Modernized Demolitions Initiator (MDI) Trainer:** This is a collection of inert components designed to train individual skills. It allows soldiers to train safely on the use of the new MDI system with both standard and special purpose military demolitions. Fielding to first units is 2d Qtr, FY 96.

• **Crane Simulator:** An NDI, universal cab crane simulator, is used to simulate multiple cranes. Currently, due to funding, there is no acquisition strategy.

• **HAB and Breacher Trainers:** Institutional trainers used to teach individual and crew skills. It will be based on the current M1 Drivers Trainer with control and software modifications. It is currently not funded.

• **Standoff Minefield Breacher Trainer (SMBT):** The SMBT is in the concept phase and will replace the MICLIC. The trainer is predicted to be a multipurpose system to be used for individual, unit, force-on-force, and institutional training. A fielding date has not been determined.

CONCLUSION

This section deals with areas specific to training in engineer and mine warfare. For further information on Army-wide training initiatives and issues, and for a detailed explanation of fielding and funding status, please consult Annex R, Training, of the *1995 Army Modernization Plan.*

SECTION 6

CONCLUSION

A unified commander's capability for warfighting and OOTW is highly dependent on a modern, versatile, robust, and highly proficient engineer force. Army engineers will continue to provide the highest degree of dedicated service. However, they need modern and adequate quantities of equipment to fulfill their missions in the envisioned Force XXI Army.

EMPHASIS FOR THE FUTURE

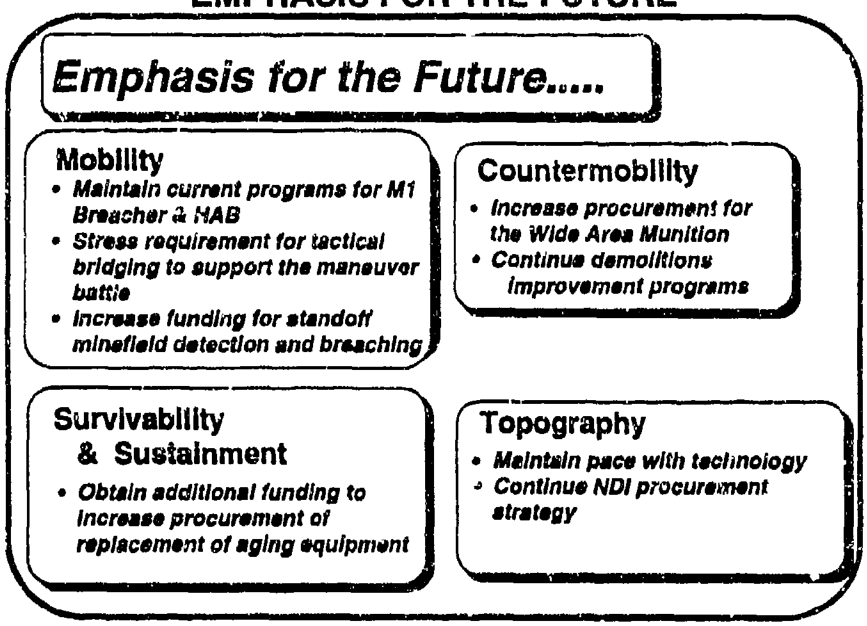


Figure K-15

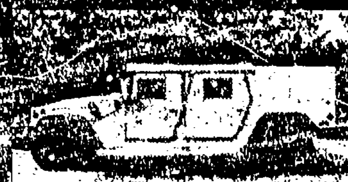
Several mission areas require emphasis if Army engineers are to remain contributors to mission accomplishment. In the area of mobility, current programs must be maintained and procurement quantities increased in order to provide more depth to other than Force Package 1 units. Countermobilty systems must continue to improve. The Wide Area Munition gives the Army a new threshold for mine warfare, and modern demolitions programs show promise of revolutionizing combat engineering techniques. In the area of sustainment and survivability, replacement or upgrades of engineer construction equipment must receive more funding throughout an aggressive program into the far-term. Finally, topographic engineering must continue to keep pace with technology through aggressive programs that capitalize on commercial breakthroughs.

Army modernization in the Engineer and Mine Warfare mission area is currently **AMBER** but will degrade in the mid-to-far-terms. Consequently, the capabilities of Army engineers to support all military operations will diminish in the future.

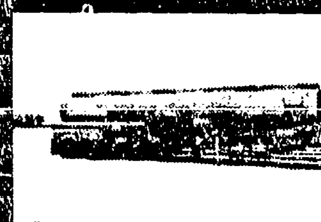
ANNEX L

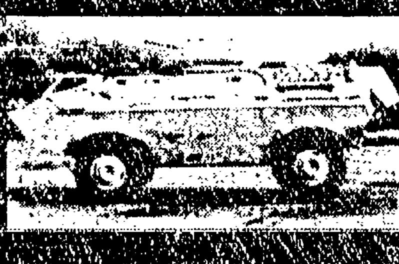
TACTICAL WHEELED VEHICLES

TRUCKS



THE BACKBONE OF THE ARMY





ANNEX L

TACTICAL WHEELED VEHICLES

SECTION 1

INTRODUCTION

TWV funding has continued to decline. Funding support for TWV in the current Program Objective Memorandum (POM) period (FY 96-01) has dropped to less than 30% of required levels; see Figure L-1. TWV funding, as a percentage of Research, Development and Acquisition (RDA) funding, declines from six percent to one half of one percent. TWV funding relative to the rest of the Combat Service Support (CSS) programs also declines. The TWV portion of overall CSS funding is below its previous level of support. At current levels, TWV procurement programs do not achieve the modernization goals for vehicle fleets, or maintain a warm production base.

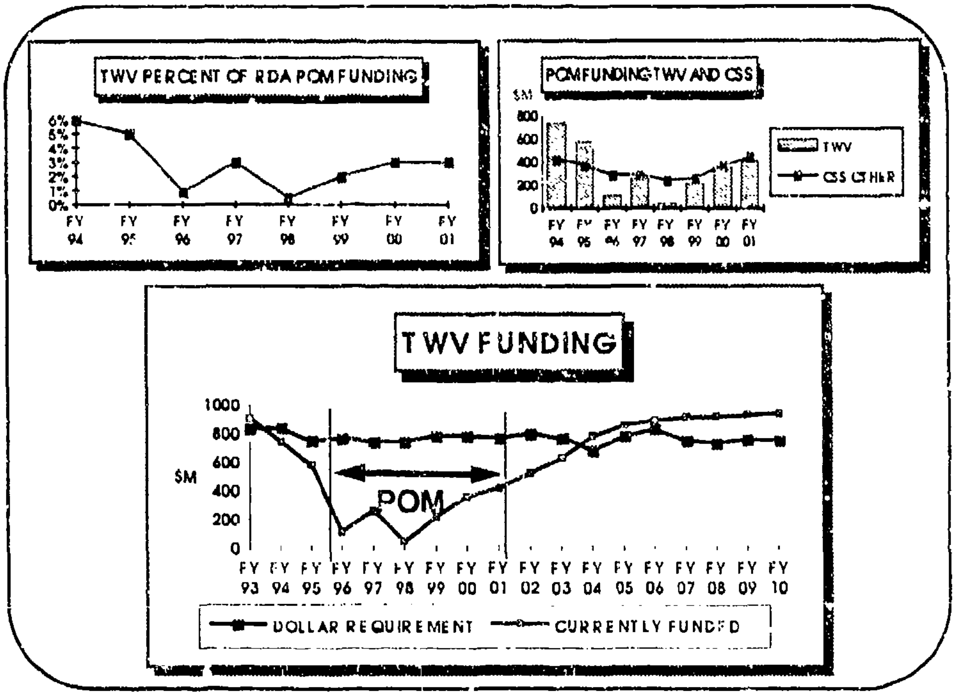


Figure L-1

The shortfall of TWV POM funding delays long overdue medium fleet modernization. Light and heavy fleet modernization rebuys are delayed until the Extended Planning Annex (EPA) years. As Figure L-2 shows, shortage of near-term funding causes the Army to lose the gains made over the past 10 years and be dependent on a fleet 60% over-age by 2010.

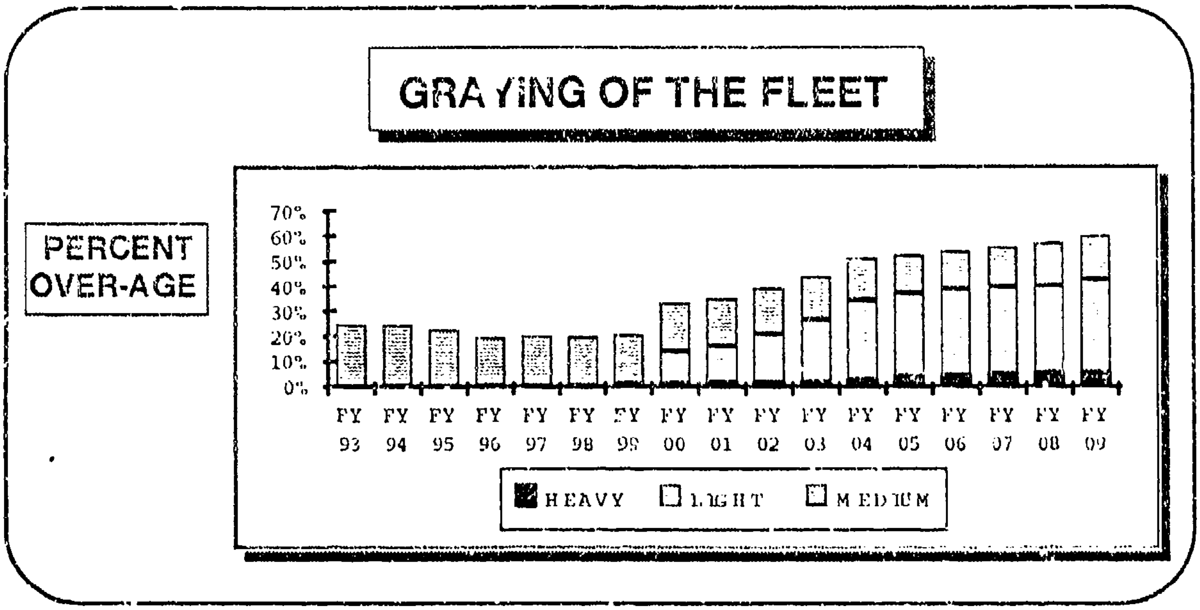


Figure L-2

The Army is laying the groundwork for a highly mobile, lethal strike force under the conceptual umbrella of Force XXI. The TWVs required to provide the backbone of Force XXI must be modernized.

SECTION 2

WARFIGHTING CONCEPTS

The U.S. Army is heavily dependent upon TWVs to execute war plans and Operations Other Than War (OOTW). Efficient and effective mobility provided by TWVs is crucial to all battlefield functions. Figure L-3 notes the percentage of Army TWVs employed by branch: infantry, artillery, transportation, etcetera. Weapon systems destroy the enemy, but TWVs provide the critical ammunition and fuel for that destruction, make units mobile about the battlefield, and provide unit sustainment. TWV employment is either integral to, or highly supportive of, all five Army modernization objectives:

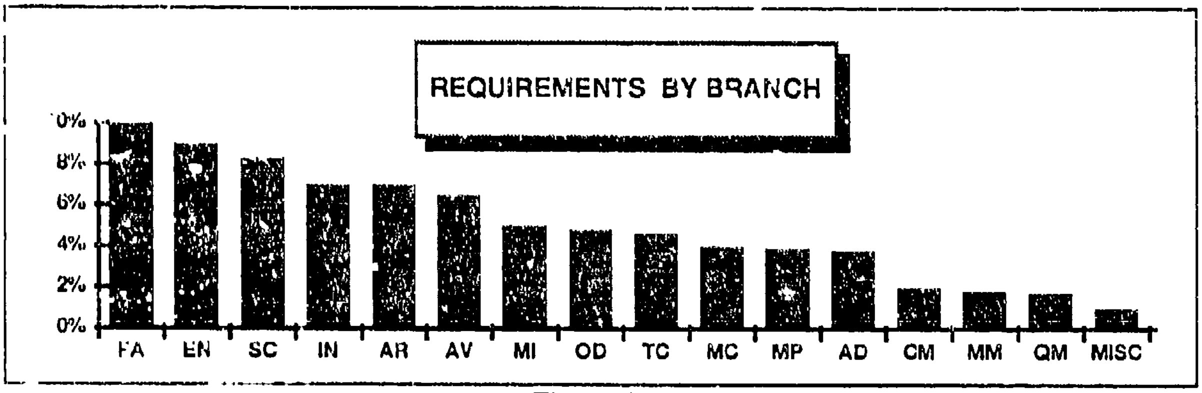


Figure L-3

Project and Sustain the Force. The critical role of TWVs often goes unrecognized. Rapid force projection, extended communication lines, and the likelihood of forcible entry into a logistically bare area of operations places unique demands on the Army. When the force is alerted, requirements for trucks begin immediately as Continental United States (CONUS) installations move unit equipment to air and sea ports of embarkation. Once in the theater, large numbers of TWVs, in all configurations, rapidly move the force from the debarkation point to reception areas forward. As the maneuver force moves deep into the area of operations, the logistics structure is tailored to meet tactical requirements. TWVs move all classes of supplies rapidly into and within the operational area and are inextricably tied to operational

success. TWVs provide bulk cargo, food, ammunition, and petroleum, oil and lubricants (POL) needed in corps and division areas. TWVs also contribute to soldier's morale by transporting laundries, water trailers, kitchens and all the other items so important to sustaining the soldier in the field. Additionally, new TWVs have improved reliability, availability, maintainability (RAM) requiring less infrastructure for their support and therefore, free up personnel and dollars to support combat systems. Funding support to upgrade current TWV and procure more modern TWV is required to maintain this RAM improvement.

PROJECT AND SUSTAIN

▭ = KEY TO THIS MODERNIZATION OBJECTIVE

	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRL'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure L-4

Protect the Force. TWVs serve as weapon system platforms, command and control vehicles, weapon prime movers, and tank transporters in combat units. These weapon and command and control systems are, for the most part, state of the art technology, employing laser-guided missiles, fiber-optic guidance systems, and infrared target acquisition. TWVs are required to ensure these sophisticated systems are agile and mobile on the battlefield.

PROTECT THE FORCE

= KEY TO THIS MODERNIZATION OBJECTIVE	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRLR'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure L-5

Win the Information War. With the emergence of new generations of automated systems and sophisticated management information systems, field commanders have critical battlefield information at their fingertips. In a world of satellite links, telemetry, "smart" computers, etc., the TWV role is paramount in providing mobility to these systems.

WIN THE INFORMATION WAR

▒ = KEY TO THIS MODERNIZATION OBJECTIVE

	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRLR'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure L-6

Conduct Precision Strike. Modern weapons, such as the Multiple Launch Rocket System (MLRS), Apache, Avenger, Bradley, Abrams, PATRIOT and the Paladin Gun System, rely on ammunition resupply by TWV to sustain maximum fire on a target. TWVs deliver the ammunition for these key combat systems making the TWV integral to the success of the firing mission. TWVs are also prime movers for towed artillery and PATRIOT, and will be the chassis for THAAD and MLRS.

PRECISION STRIKE

= KEY TO THIS MODERNIZATION OBJECTIVE	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRLR'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure L-7

Dominate the Maneuver Battle. Rapid, decisive victory is the essence of Land Force Dominance which is inextricably dependent upon efficient and effective TWV support. Organic unit TWVs, such as the High Mobility Multipurpose Wheeled Vehicle (HMMWV), provide platforms for command and control capability, battlefield intelligence, and communications capability immediately upon entry into a developing theater. Other organic vehicles, such as the Heavy Expanded Mobility Tactical Truck (HEMTT), establish critical rearm and refuel capability for MLRS, main battle tanks, and combat aircraft. Palletized Load System (PLS) vehicles establish corps forward

ammunition flows capable of sustaining fighting units for the duration of the conflict. Armored scout vehicles, HMMWVs with state of the art weaponry, provide battlefield reconnaissance for maneuvering armor forces. The 70-ton Heavy Equipment Transporter System (HETS) transports the Main Battle Tanks directly forward to new maneuver positions, allowing them to arrive fully fueled, armed and with a fresh crew. TWVs are air transportable, most by C-130 and C-141 aircraft, allowing units to deploy rapidly and be capable of engagement immediately upon arrival in the theater. TWVs are integral to armor, infantry, field artillery, air defense artillery, signal, air-assault, aviation, medical and logistics forces alike.

DOMINATE MANEUVER

= KEY TO THIS MODERNIZATION OBJECTIVE	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRLR'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure L-8

SUMMARY

TWVs, more than ever before, are crucial to the execution of successful campaign plans. TWVs deliver the ammunition and fuel that enable sophisticated weapons to kill the enemy, provide sustainment for the soldiers that operate them, and are the chassis and prime movers for key combat systems.

"Sometimes soldiers like me need to be reminded that trucks are as important as tanks."
GEN Norman Schwarzkopf
CINCCENT

SECTION 3

CURRENT PROGRAM ASSESSMENT

Recent degradation of POM funding significantly blocks TWV modernization efforts. Assessments of the TWV fleet capability to meet battlefield requirements with current and programmed assets, and appraisals of progress made toward fleet retirement goals, are addressed here.

Army Acquisition Objective (AAO). The TWV AAO is that quantity of TWVs required for units, Preposition (PREPO) ships, war reserve stocks, operational projects and operational maintenance floats. Army downsizing coupled with policy decisions changed TWV requirements computation since the May 1994 AMP. Previously, the Army's objective was to buy TWVs to a Procurement Objective. The Procurement Objective was a quantity less than the AAO and considered to be an affordable goal. Figure L-9 reflects the AAO upon which this update is based. Use of the AAO places TWV on the same equipment fill goal as other Army systems.

ACQUISITION OBJECTIVES

FLEET	AAO	CHANGE FROM 1994
LIGHT		
HMMWV	104,895	+95
CUCV	12,987	0
MEDIUM		
LMTV	40,320	-1,515
MTV	45,080	-683
HEAVY		
PLS	3,262	-67
HET	2,148	+48
HEMTT	13,145	+10
LINE HAUL	4,771	+132
ENGR TRACTORS	3,127	+41
TOTAL	229,735	-1,939

Figure L-9

Requirements Determination. Virtually all Army Table of Organization and Equipment (TOE) units require, and are expected to continue to require some TWVs, as they represent the most flexible and cost effective mode of transport available. Any plan for fleet modernization must be constructed upon a firm foundation of known and valid requirements. The determination of TWV requirements at the unit and at the aggregate levels is vested in the TRADOC Tactical Wheeled Vehicle Requirements Management Office (TWVRMO). Since its inception, the TWVRMO analyzes each TOE unit design as it is being built, and determines the most cost and operationally effective mix of vehicles to satisfy mission needs. Factors considered in this validation process include the doctrinal unit mission, battlefield location, unit support relationships, personnel and equipment densities, ammunition firing rates and fuel consumption rates. The purpose of TWVRMO is to ensure Army statements of TWV requirements represent minimum essential needs for wartime missions, are a credible basis for fleet plans and programs, and are defensible.

Assessment Methodology. The Army continually assesses its TWV fleet capabilities and ownership characteristics. The assessment presented here includes a general TWV program assessment, an overall fleet capability assessment, and an assessment by fleet class (light, medium and heavy). What each fleet program does or fails to do is also presented.

Overall Program Assessment. TWV investment during the 1980s went primarily to eliminate capability shortfalls. In the 1980s, the Army fielded the HMMWV, the HEMTT, and filled 5-ton shortages with new vehicles. In the 1990s PLS, HETS, Line Haul Tractors and Engineer tractors were, and are, being fielded. The entire 2-1/2 ton fleet and older 5 ton vehicles bought during the Vietnam era, and shortly thereafter, continued to age. Today nearly all 2-1/2 ton and 5 ton vehicles suffer performance degradation and are past their economic useful life. The 5 ton fleet had procurements of new assets throughout the 1980's and early 1990's so that its overall condition is not as bad as the 2-1/2 ton. The enhancements to the 5 ton maximized the improvements in this vehicle.

The Family of Medium Tactical Vehicles (FMTV) is the next generation of the 2-1/2 and 5 ton fleets. FMTV's design takes advantage of TWV state-of-the-art technology developed both in the United States and overseas. Its design will make the Army more rapidly deployable, less expensive to maintain and more mobile on the battlefield.

The requirement to replace the medium fleet and take near-term action to prevent a highly capable light and heavy fleet from deteriorating early in the next decade occurs at a time of major resource reduction. It also occurs during a time when the Army is expending resources to conduct OOTW, i.e., Somalia, Rwanda, Haiti, which were not programmed. Figure L-10 displays fleet age from 1994 to 2010. It includes an infusion of FMTV procurements scheduled to occur in the latter years of the POM and EPA.

FLEET AVERAGE AGE
1994 vs END POM/EPA

VEHICLE	ECONOMIC LIFE	MAX FLEET AVG AGE OBJECTIVE	FLEET AVERAGE AGE 1994	2010
CUCV	12	6.5	7.7	24
HMMWV	14	7	5	15.8
SUSV	15	7.5	6.2	21
M151	15	N/A	16.7	N/A
M880	7	N/A	16.1	N/A
2-1/2 TON	20	10	24.7	23.4
5 TON	22	11	13.9	16.7
PLS	20	10	N/A	15.1
HEMTT	20	10	7.1	17.8
ENG TRAC	20	10	9.9	24.9
LINE HAUL	20	10	11.1	25.7
HET	14	7	15.7	20.5
M123	14	7	25.4	NA
TOTAL AVE	17.8	8.9	12.7	18.9

Figure L-10

Overall TWV Fleet Capability Assessment. The major changes from the May 94 AMP revolve around POM and EPA funding reductions. These funding reductions fail to fix the medium fleet and permit the light and heavy fleets to degrade in the far-term. Figure L-11 depicts the overall fleet assessment. Rating definitions are:

RED - No capability exists, or vehicle is incapable of performing mission or providing required support;

AMBER - A limited capability or quantity exists to perform the mission; and

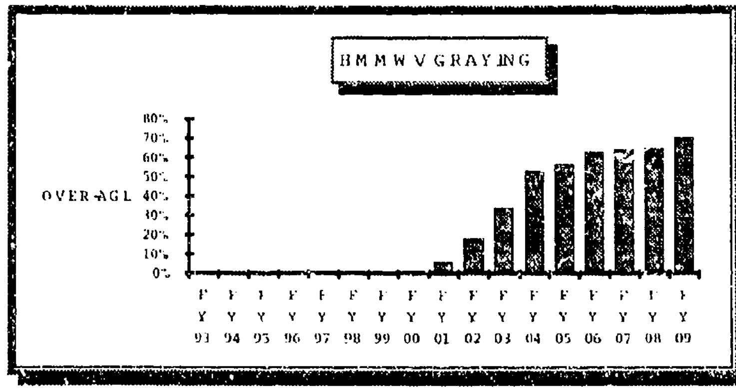
GREEN - Adequate capability and quantity exists to perform the mission.

ASSESSMENT OF THE FLEET - 1994

CATEGORY	ON HAND	NEAR 95-96	MID 97-00	FAR 01-09
LIGHT	136,156			
HMMWV	83,543	GREEN	GREEN	AMBER
CUCV	46,782	AMBER	AMBER	RED
SUSV	985	GREEN	GREEN	AMBER
M151	1,030	RED	RETIRED	RETIRED
M880	1,816	RED	RETIRED	RETIRED
ASV	0	RED	GREEN	GREEN
MEDIUM	107,309			
2-1/2 TON	53,505	RED	RED	RED
LMTV	0	RED	AMBER	AMBER
5 TON	53,804	AMBER	RED	RED
MTV	0	RED	RED	AMBER
HEAVY	21,702			
PLS	388	GREEN	GREEN	GREEN
HEMTT	12,501	AMBER	AMBER	AMBER
HETS	710	AMBER	AMBER	AMBER
LINE HAUL	4,942	GREEN	GREEN	RED
LET	1,907	GREEN	GREEN	AMBER
MET	871	AMBER	AMBER	RED
M 123	383	RED	RETIRED	RETIRED

Figure L-11

Light Fleet Assessment. Except for the Heavy HMMWV Variant, the current overall condition of the light fleet is **GREEN** in near-term and mid-term. The condition of this fleet will deteriorate rapidly beginning in 2000 (Figure L-12). The current programmed funding profile will make this fleet **AMBER** in the far-term.



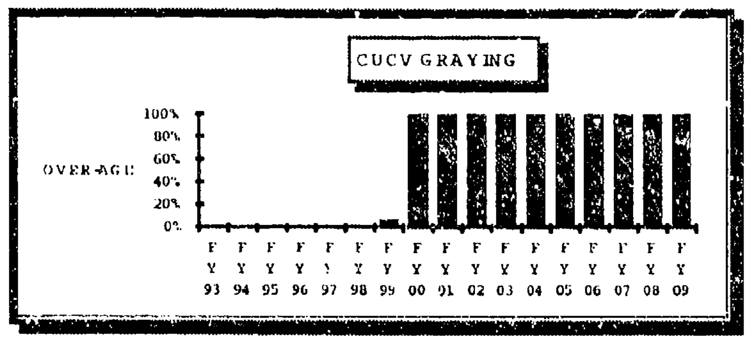


Figure L-12

High Mobility Multipurpose Wheeled Vehicle (HMMWV). This fleet is **GREEN** in the near-term and mid-term. The HMMWV supports all five Army modernization objectives and operates in Divisions, brigades, armored cavalry regiments, and corps units. HMMWVs are critical to all warfighting and OOTW missions. There are three HMMWV generations–the basic HMMWV procured from 1984 to 1993, the A1 HMMWV, and the A2 HMMWV. The A1 HMMWV, procured beginning in 1994, upgraded the basic HMMWV with an improved braking system, power train, and soldier enhancements. The A2 HMMWV, scheduled for procurement beginning in 2nd Qtr 95, further enhances the A1 with a new engine and transmission that meets EPA emission requirements. The HMMWV also has an up-armored version that is used by Military Police and scout units. The Up-Armored HMMWV has already proven its worth in Somalia, Haiti and the Balkans. Figure L-13 shows that the percentage of the HMMWV fleet that is over-age goes from 1% in 2000 to 70% as we field Force XXI in 2010, reducing this fleet's capability in the far-term from **GREEN** to **AMBER**.

Commercial Utility Cargo Vehicle (CUCV). The CUCV fleet is **AMBER** and will remain so until they become over-age in the far-term and become **RED.** CUCVs are currently within economic useful life, but as Figure L-12 shows, this fleet, procured in the mid 1980's, goes almost totally over-age in 1999. CUCV type vehicles continue to meet light transport tasks in Echelon Above Corps (EAC) units. General Motors Corporation (GMC) recently proposed replacement of the CUCVs in DoD, in exchange for, strategic stockpile materials and turn-in of old CUCVs. The Army and DoD are

evaluating the proposal. If the proposal is accepted, the First Unit Equipped (FUE) date will be FY 96.

Armored Security Vehicle (ASV). The ASV moves from **RED** in the near-term to **GREEN** in the mid- and far-term. These vehicles are for use by Military Police units for OOTW, convoy escort and combat in cities. A procurement of 95 of these vehicles is planned for support of the Contingency Corps and the training base. The ASV is a complementary vehicle to the Up-Armored HMMWV in Military Police units.

Small Unit Support Vehicle (SUSV). The SUSV is **GREEN** in the near- and mid-terms and is **AMBER** in the far-term. Sufficient assets are on hand to meet requirements. The rating of **AMBER** is due to fleet aging without replacement.

Medium Fleet Assessment. This fleet is composed of over-age 2-1/2 ton, 5 ton, and the new Family of Medium Tactical Vehicles (FMTV). The entire medium fleet is **RED** throughout the period. Although FMTV is targeted to replace 2-1/2 and 5 ton trucks Army-wide, the recent POM funding decrements to this program terminated the fifth year of the first five year multiyear. This cancellation moves the start of the second contract from FY 97 to FY 99. These actions worsen an already degraded situation.

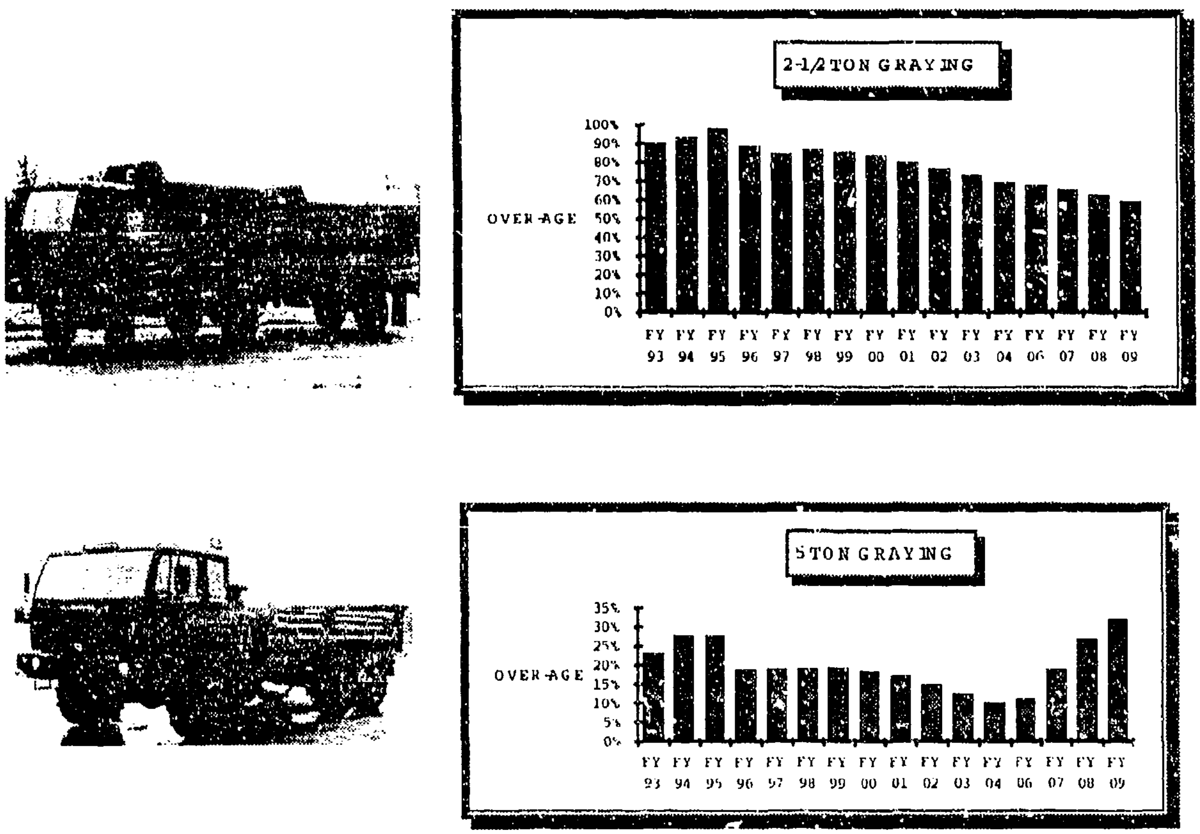


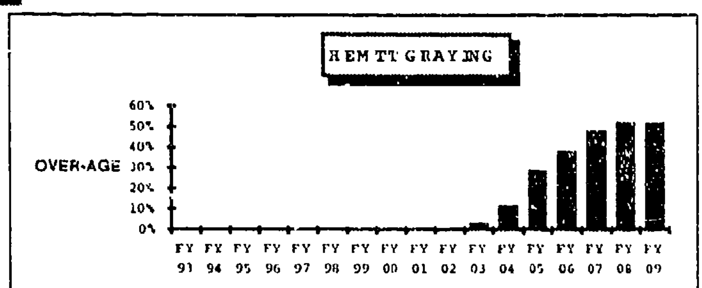
Figure L-13

2-1/2 Ton. This fleet is **RED** throughout the period. All fielded 2-1/2 ton vehicles are over-aged (Figure L-13). Current funding levels through the EPA to replace these vehicles (with the more capable 2-1/2 Ton Light Medium Tactical Vehicle (LMTV) of the FMTV family) do little to correct this deficiency. Additionally, the Army has initiated an ESP for selected National Guard and U.S. Army Reserve 2-1/2 ton vehicles to bring technical insertion to these vehicles until they receive LMTV. If funding is not restored and increased for the LMTV, the 2-1/2 ton fleet will remain **RED** well into the 21st Century.

5 Ton. This fleet is **AMBER** in the near-term because of the newer models introduced in the 1980s. The fleet is projected to be **RED** in the mid-term and far-term. The funding level for the 5 ton variant of the FMTV, the Medium Tactical Vehicle (MTV), is far below the requirement. Slowing or delaying procurement imposes a mixed fleet of over five different types of 5 ton vehicles, increases the Army's logistical tail and hampers a unit commander's ability to support the Army's five modernization objectives. Figure L-13 displays over-all 5 ton age.

Heavy Fleet Assessment. This fleet consists of the PLS, HEMTT, Line Haul Tractors (M915), Engineer Tractors (M916 and M920), and HETS. The fleet is **GREEN** overall, and remains so until 2005. However, critical PLS, HEMTT wrecker and tanker, shortages continue to exist because of reduced resources.

PLS DOES NOT GO OVER-AGE DURING THE POM/EPA.



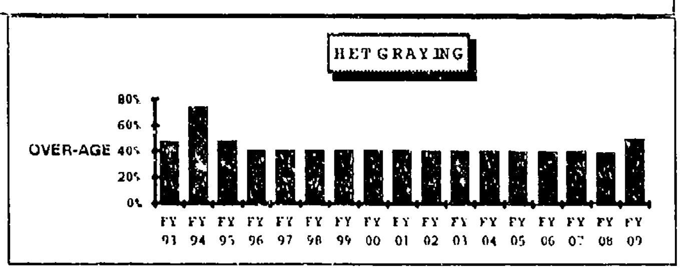


Figure L-14

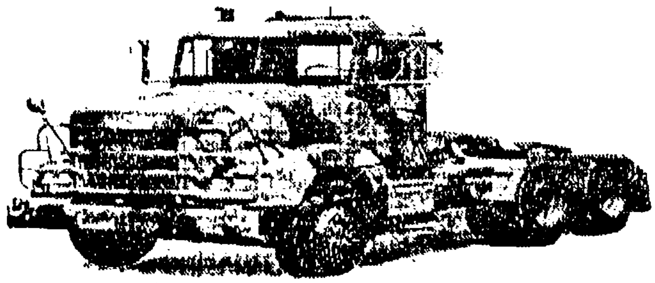
HEMTT. This fleet is **AMBER** throughout the period because the percentage of fill is 80% and procurement is not resourced. The HEMTT family of vehicles provides the bulk of the Army's rearm and refuel transport to front line weapon systems such as Main Battle Tanks, MLRS, Bradley Fighting Vehicle Systems, and Attack helicopters. Their combat capabilities are closely tied to the availability of capable HEMTTs. Current programmed resources produce aging of this fleet (referred to as "ship of the desert" by combat soldiers) from 3% over-age in FY 03 to 52% in FY 09. The extensive use of HEMTTs in Operation Desert Storm (ODS) accelerated wear on a large percentage of the current fleet.

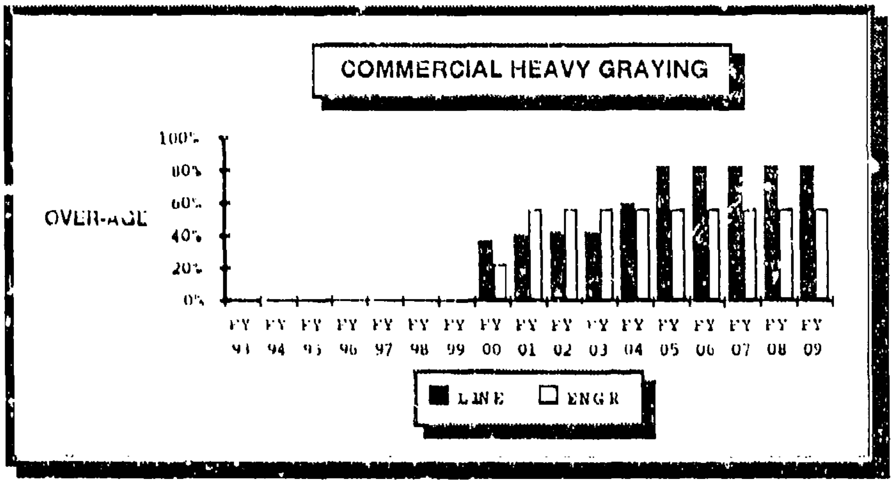
PLS. This fleet is **GREEN** throughout the period. Since the last AMP update, PLS fielding has begun to Army units and PREPO ships. These highly capable, efficient, more mobile ammunition distribution system platforms do not begin to go over-age until 2014. Quantitatively, however, PLS will satisfy only 84% of the requirement and PLS flatrack procurement is far below that required to capture the full advantages this system offers, not only in the ammunition role, but in future follow-on uses.

HETS. HETS are **AMBER** throughout the period. The new 70 ton HET is currently being fielded. In FY 94, 74% of on hand assets were over-age (Figure L-15). Assets fielded in FY 94 and FY 95 reduced the percentage of fleet over-age to 41%, where it remains until the new HETs begin going over-age in 2008. Without replacement or upgrade programs, the entire HET fleet, most of which will be fielded this year and next, will have exceeded its economic useful life. Additionally, the Army has procured only 71% of the total HET requirement. Thus, support to Prepositioned Materiel Configured to Unit Sets (POMCUS) and reinforcing forces is insufficient as well.

Heavy Repair Vehicle (HRV). The HRV would provide a capability of "fix forward" for maintenance units. It also would provide armored protection for those soldiers assigned to the vehicle. Although Congress authorized FY 94 funds for HRV R&D, HRV procurement is not currently funded. A prototype was built and soldier tested. The HRV, intended to replace current M113 tracked maintenance vehicle, is on a PLS chassis. Even if HRV were funded, it could not be produced because there will be no PLS production line to produce the chassis.

LINE HAUL TRACTOR





ENGINEER TRACTOR

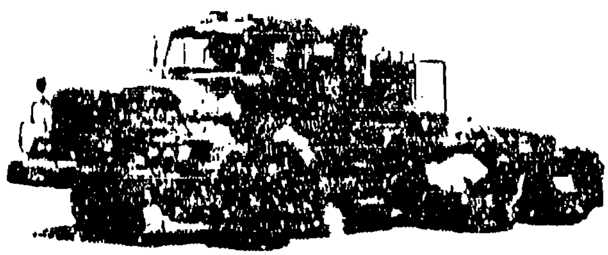


Figure L-15

Line Haul Tractors. The line haul tractor fleet is **GREEN** and will remain so through the mid-term. The M915 line haul tractors provide the bulk of the Army's distribution platform at Echelons Above Corps (EAC). These efficient commercial tractors begin going over-age in FY 00 (Figure L-15). However, heavy use has taken its toll on early models of these vehicles. Line haul tractors are in need of an upgrade and renewal program. By the year FY 10, the fleet will become **RED** because over 80% will be beyond economic useful life and will not meet the requirement.

Engineer Tractors. This fleet is **GREEN** in the near-term but changes to **AMBER** in the mid- and far-terms because the fleet becomes over-age. The M916/M920 engineer tractors procured as a component of the M915 family share similar aging characteristics. Twenty three percent go over-age in FY 00 and 57% go over-age in FY 01 (Figure L-16). A majority of the Army's new engineer tractor

capability was procured through the Reserve Component's Dedicated Procurement Program (DPP). The M123 tractor is a substitute for engineer tractors. It is currently rated **RED.** With a reduction in engineer tractor requirements, coupled with National Guard and Army Reserve procurements, sufficient M916/M920 will be on-hand by mid-term. At that time, all M123 tractors will be out of the Army inventory.

Trailer Assessment

Trailers and Dolly Sets. Funding supports some increase for critical trailers such as the supply van and the 22-1/2 ton. Overall, however, the trailer fleet does not meet either quality or quantity requirements, has too many models, and is severely over-age creating excessive Operation and Support (O&S) burdens. With the increasing use of containers to move both unit equipment and sustainment supplies, the Army is in crucial need of 40- and 20-foot container transports. Additionally, future trailer procurements should focus on reducing trailer proliferation by using the same trailer body for multiple applications. Figure L-16 graphically depicts by **RED**, **AMBER**, **GREEN**, an assessment of the Army's trailer fleet.

ASSESSMENT OF THE TRAILER FLEET-1994

		ASSESSMENT		
CATEGORY	ON HAND	NEAR 95-96	MID 97-00	FAR 01-09
LIGHT	75,664			
HMT		GREEN	GREEN	GREEN
M101/A1		AMBER	AMBER	GREEN
M101A2		GREEN	GREEN	GREEN
M105/A1		AMBER	AMBER	AMBER
M105A2		GREEN	GREEN	GREEN
M107		RED	RED	RETIRED
M149/A1		RED	RED	RETIRED
M149A2		GREEN	GREEN	GREEN
CHASSIS TRLR		GREEN	GREEN	GREEN
MEDIUM	5,167			
HEMAT		GREEN	AMBER	GREEN
M979		GREEN	GREEN	GREEN
M1034		GREEN	GREEN	GREEN
M1048		AMBER	GREEN	AMBER
M1061		GREEN	GREEN	GREEN
M1073		GREEN	GREEN	AMBER
M707/589		GREEN	GREEN	GREEN
M720		RED	RED	GREEN
M832		RED	RED	RED
M840		AMBER	AMBER	RED
M1022		GREEN	GREEN	GREEN
SEMITRLR LOW/FLAT	16,603			
M269 LB		AMBER	AMBER	RED
M270 LB		AMBER	AMBER	AMBER
M871/M872		GREEN	GREEN	GREEN
LLLC VANS		GREEN	GREEN	GREEN
SEMITRLR VAN	3,243			
M128/M129		RED	AMBER	GREEN
M313		AMBER	AMBER	RED
M373		GREEN	GREEN	GREEN
SEMITRLR TANK	4,086			
[illegible]		RED	RED	RETIRED
M900 SER		GREEN	GREEN	GREEN
M1062		GREEN	GREEN	GREEN
M1099		GREEN	GREEN	GREEN

Figure L-16

Retirement Program Update. The 1989 Tactical Wheeled Vehicle Modernization Plan (TWVMP) established a vehicle retirement policy and an execution program. This program eliminates selected vehicles with performance deficiencies, effects a reduction in Operation and Support (O&S) costs, and capitalizes on advantages of reducing the variety of vehicle makes and models. The program benefited the Drug Law Enforcement Assistance Program (DLEA) by transferring excess vehicles to help local civil law enforcement agencies. Many of the vehicles disposed through this program are sold through Foreign Military Sales (FMS). The U.S. Treasury benefits, but rarely does the Army. Normally, such funds are deleted from the Army budget. Although the Army reduces O&S costs, no new vehicles are obtained via funds generated by FMS. Figure L-17 lists the Army's revised goals based on force structure changes, as well as the status of goal attainment.

RETIREMENT PROGRAM UPDATE

VEHICLE	RETIRED FY 90-94	FY 95	FY 96	FY 97
M880	23,015	729	0	0
GAMA GOAT	5,932	N/A	N/A	N/A
M151	39,440	826	0	0
2.5 GAS	1,881	N/A	N/A	N/A
2.5 MF	4,164	763	2,000	2,000
5 TON OLDER	4,864	1,063	2,000	2,000
M123	809	136	0	0
M746	117	N/A	N/A	N/A
GOER	1,176	N/A	N/A	N/A
MULES	219	N/A	N/A	N/A
CUCV	6,954	2,000	2,000	2,000
TOTAL	88,571	5,517	6,000	6,000

Figure L-17

SUMMARY

POM funding allocated to the light fleet is inadequate; it does not address the replacement needs of the HMMWV and CUCV or initiate an upgrade program to extend their useful life.

Funding does not improve the ailing condition of the medium fleet. Under optimistic funding projections, the 2-1/2 ton payload category improves to only 60% over-age, and the 5 ton payload category over-age percentage increases.

POM funding does not overcome the degradation of the highly capable HEMTT fleet that was so critical to success in Operation Desert Storm. Funds are not available to provide PLS trucks and trailers to fill requirements. Finally, current funding only procures 45% of flatrack requirements.

POM funding, and what it does and does not do for each fleet, is shown in Figure L-18.

LIGHT FLEET

DOES	DOES NOT
PROCURE UP ARMORED HMMWV. PROCURE THE ASV.	PROCURE LIGHT AND HEAVY HMMWV UNTIL EPA. REBUY THE CUCV.

MEDIUM FLEET

DOES	DOES NOT
KILL FMTV PROGRAM.	START NEW CONTRACT UNTIL FY 99. FILL FP I UNTIL EPA. PROCURE ESP FOR ACTIVE ARMY.

HEAVY FLEET

DOES	DOES NOT
PROCURE HETS FOR PREPO SHIPS. ADDITIONAL FLATRACKS AND CONTAINER LIFT KITS.	PROCURE PLS FOR ADDITIONAL ARTILLERY BRIGADE CONCEPT OR FOLLOW ON USES. PROCURE HEAVY LINE HAUL AND ENGINEER TRACTORS. PROCURE HEMTT UNTIL FY 08 PROCURE UPGRADE FOR ANY HEAVY VEHICLES.

TRAILERS

DOES	DOES NOT
PROCURE SUPPLY VAN. PROCURE HMT. PROCURE M871 TRAILERS. PROCURE M1061 TRAILERS. PROCURE M1022A1 DOLLY SETS. PROCURE SOME FMTV TRAILERS.	PROCURE OTHER TRAILERS. 5,000 GALLON FUEL TANKERS. PROCURE CONTAINER/EQUIPMENT TRANSPORT TRAILERS.

Figure L-18

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

Overall Strategy. The overall strategy of acquiring TWVs is through Non-Developmental Items (NDI) acquisition programs. The NDI approach permits leveraging of commercial technology when doing so makes sense. This reduces research and development (R&D) expenditures by tailoring commercial technology to meet unique military needs. The idea is to encourage the use of "dual use" technology in which the military maximizes the use of technology from the commercial industrial base.

Science and Technology Strategy. Although the majority of the Army's TWV requirements can be met by technology embedded in the commercial truck industry, there are some unique military applications which have insufficient commercial interest to be pursued by industry. The Military TWV, unlike its commercial counterpart, must be capable of operation under the most extreme environmental conditions, under hostile fire, and maintenance in the most austere conditions. Such military unique considerations compel pursuit of some limited research and development activities. The U.S. Army Tank-Automotive and Armaments Research, Development, and Engineering Center (TARDEC) is advancing technologies that improve vehicle mobility, performance, durability, vehicle weight reduction, maintenance time and support cost characteristics. These technologies are pursued for integration into existing and/or new systems.

National Automotive Center (NAC). Many dual use programs in government, industry and academia can contribute to TWV. The Army is developing state of the art automotive technologies for combat systems that also relate directly to improvements in tactical and commercial wheeled vehicles. Recognizing this, and with assistance from the Congress, the Army established the NAC in FY 93. The NAC, located at TARDEC, serves to accelerate the development and integration of dual use automotive technologies, and to encourage collaborative research and development (R&D) among the government, industry and academia. Its strategic thrusts are to identify and pursue high payoff dual use technologies and processes that offer significant performance and cost payoffs. Efforts are focused on advanced propulsion systems; adaptive controls; light weight materials; polymeric composite structures; silicon carbide power electronics; onboard sensors, displays and other automated vehicle systems; virtual prototyping tools; energy storage devices; rapid, flexible manufacturing; and flexible assembly systems. Technologies in any of these areas could be applied to TWV to enhance performance or reduce ownership costs.

TWV Modernization Strategy. The Army is in some phase of TWV modernization continuously to meet stated goals and objectives. Rarely are funds

sufficient to modernize in a timely manner or to modernize all of any particular fleet at once. Given these realities, the Army's modernization strategy includes precepts such as:

- Buy as much modernization as available funds will allow and do so in a balanced way.

- Modernization via Extended Service Program (ESP). ESP can provide for technical insertion and extend the EUL of the vehicle. Ideally these programs occur at vehicle mid-life. Upgrade programs are addressed below. The current Army ESP is targeted at the 2-1/2 ton fleet. Its purpose is to extend the life of on hand assets, while improving performance, and reducing ownership costs. Unfortunately, this program was not initiated until the majority of 2-1/2 ton vehicles were over-age. Active Army funding for the program was lost in the previous POM. Continuation of the program must rely on dedicated funds from the National Guard and the U.S. Army Reserve. Unfortunately, where there is an asset shortage, ESP does not increase on hand quantities.

- Meet National Standards. The Army is committed to complying with National Standards, such as the Federal Motor Vehicle Safety Standards (FMVSS) and the Environmental Protection Agency (EPA), for emission standards.

- Priority to "First to Fight." Prioritize the distribution of modernized vehicles and allocate shortages by Force Packages.

- Standardize. Acquire a fleet of standard vehicles where feasible to do so.

- Industrial Base. Strive to retain an essential and flexible base of production.

TWV Programmed in the POM Section 3 previously assessed how the POM and EPA funding affect the capability and relative health of each fleet segment. Figure L-19 is a pictorial representation of TWV procurements currently planned.

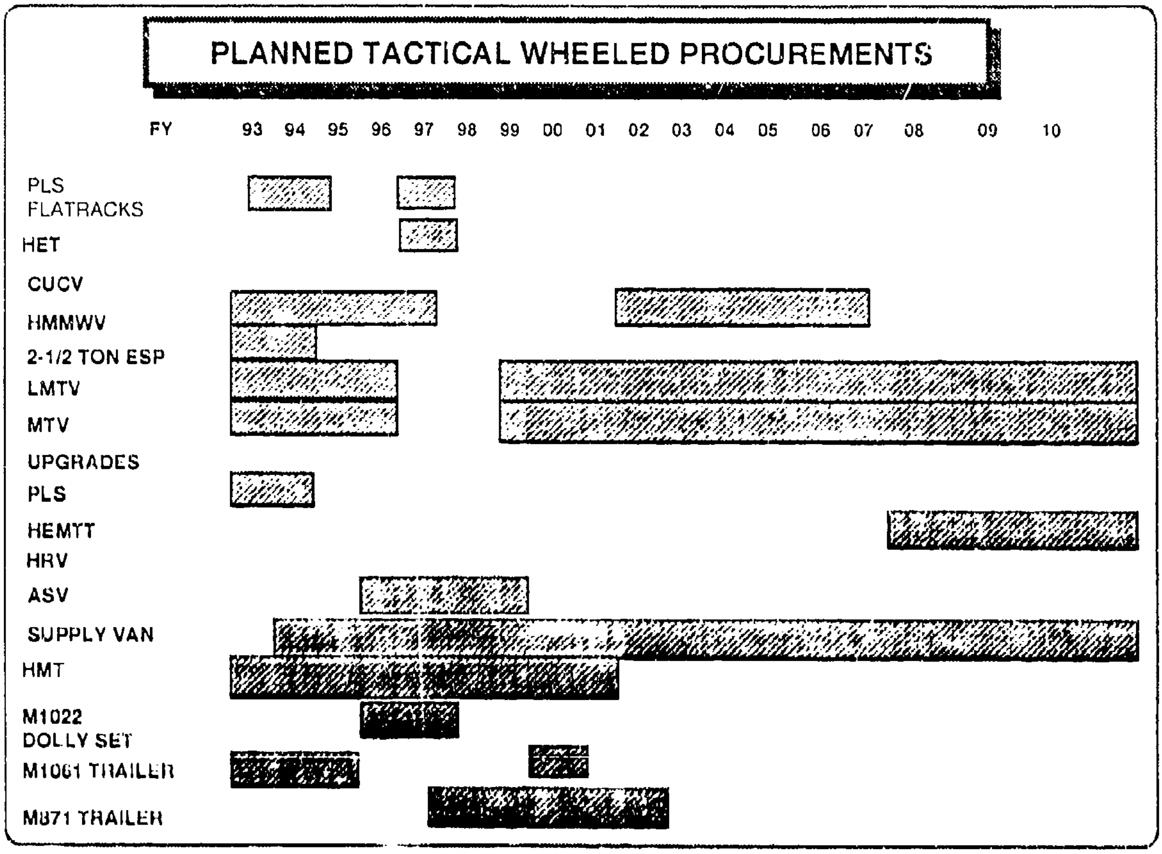


Figure L-19

Replacement Investment Strategy. The Army's fleet replacement requirements are computed on the basis of Economic Useful Life (EUL). EUL is an estimate of the average age at which an asset is more cost effective to replace than retain. For example, the current 2-1/2 ton truck has an EUL of 20 years. As trucks are used past their EUL, they become less reliable, require more maintenance, are kept "in the shop, off the road" more frequently, and longer, each time they break down. This means fewer vehicles are used more often. What level of resources must be used to maintain the fleet at its ideal half life? Various studies calculate $1.2B to $1.6B per year. A funding level of $750M, plus or minus 15 percent, and approximately $50M for trailers was considered adequate. The following Figure L-20, shows a combination of upgrade programs and new procurement that could get the TWV fleet through these times of reduced funding levels.

ADDITIONAL FUNDS REQUIRED

PROGRAM	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
FMTV	343	313	278	0	0	0
HEAVY TRUCKS (PLS, HET,HEMTT)	80	10	89.8	86.9	84.4	69.5
HMMWV	55	47	100	100	100	0
HMMWV UPGRADE	0	9.3	22.5	25.5	25.6	37.5
5 TON UPGRADE	10.4	26.1	27.8	27.0	26.2	1.6
HEMTT UPGRADE	0	0	10.2	13.1	15.6	30.5
PLS FLATRACKS	28.6	0	28.6	28.6	28.6	28.6
TOTAL $$	517	405.4	556.9	281.1	280.4	167.7

Figure L-20

Upgrade Based Investment Strategy. Over time, TWV, like all hardware systems, deteriorates with use. If replacement is not feasible when deterioration becomes a liability, or is cost prohibitive, other alternatives must be explored. Upgrade programs which can address either the capability deficiencies or cost of ownership characteristics, or other pressing needs, can be structured for select vehicle fleets. ESPs extend the service life of candidate vehicles while addressing vehicle modernization shortcomings. ESPs could, for example, insert new technology into old chassis in selected fleets to improve reliability, durability, maintainability, safety, parts availability, and National Standards compliance. Potential upgrade and or ESP programs to improve specific fleet segments are shown in Figure L-20. These upgrades are currently unfunded. Examples of these programs are:

- 5 ton. Upgrade M939 series 5 ton vehicles to the M939A2 series configuration by inserting state of the art engines, transmissions, central tire inflation system, and antilock braking systems.

- HMMWV. Upgrade by inserting A2 model engines, antilock brakes, and central tire inflation systems.

- HEMTT. Upgrade by inserting a power train common to all other military type heavy vehicles, higher performance tires, independent suspension, central tire inflation system, antilock brakes and a new vehicle warranty.

Truck Industrial Base. As the Army and its budget downsize, concerns arise about the ability of the Army to continue its programmed TWV acquisitions from the industrial base. Perhaps equally important, are concerns over availability of the vendor base for repair part and component supply. Studies are underway to investigate the details of potential remanufacture and technical insertion needs and proposals.

Depot Rebuild and Overhaul Programs. Depot programs typically restore vehicles to their issuable condition (one that approximates the initial configuration of vehicles). Such a restoration/rebuild program can convert some TWV to other uses, as well. A current depot program focuses on the heavy fleet. The heavy fleet represents vehicles that are generally more costly and are fewer in number and therefore, justify the expense of the depot conversion. For example, to save procurement funds, M977 HEMTT cargo trucks are being converted to Ribbon Bridge Transporters. Other planned depot repair programs are shown in Figure L-21.

DEPOT LEVEL REPAIR

ITEM	QUANTITY
M172A2 SEMITRAILER	67
M747 SEMITRAILER	34
M911 HET	18
HEMTT CARGO LIGHT CRANE	27
HEMTT CARGO MEDIUM CRANE	113
HEMTT TANKER	24
M872 SEMITRAILER	155
M870 SEMITRAILER	15

Figure L-21

Commercial Assets Mobilization (CAM) Program. The U.S. Army Reserves currently have this program under consideration. The program permits the Army to lease commercial vehicles similar to those the Army uses in the heavy commercial design fleet. This program has the advantage that units would be able to train and be ready. The program would apply to lower priority units, who have more time to deploy than those in the Contingency Corps. Funding for the program is a problem. CAM

requires procurement funds to lease vehicles, or operation and maintenance funds to procure vehicles. Innovative contracting methods and funding will be required to make CAM viable.

Return from Europe (RETROEUR) Program. This program uses National Guard and Reserve repair sites to bring equipment returning from Europe up to fully mission capable standards. The Army is using this program to fill unit shortages in Department of the Army Master Priority List sequence. The Army National Guard, Army Reserve and high priority Active Component units benefit from this program.

Summary. The Army continually assesses the TWV fleet in terms of capability, deficiencies and ownership cost growth, and it recommends replacements or other measures to keep the TWV fleet rolling. The Army's goal is to maintain fleet EUL at half-life. A combination of new procurements, ESP, upgrade and depot repair programs are required to maintain the fleet and achieve the half EUL goal. It is unclear whether the TWV industrial base can be maintained given the low level of new procurements, upgrades and ESP.

SECTION 5

TRAINING

Figure L-22

The training objective for TWVs is to have vehicle operators, maintainers, and leaders acquire and retain the skills needed to ensure effective use of TWVs in support of ground forces.

New Equipment Training (NET) and Technical Manual Validation/Verification (TM-V/V). NET is the vital link between the materiel developer and the operators and maintainers. The Tank-Automotive and Armaments Command (TACOM) is responsible for specific TWV NET. TACOM teams are trained by the contractor. Once trained, these teams conduct Direct Support/General Support (DS/GS) maintenance training in-house at TACOM, and operator and unit maintenance at the locations of units which receive new TWVs. DS/GS maintenance training is conducted within 90 days prior to fielding. Operator and unit maintenance training is conducted immediately after TWV deprocessing at the gaining installation. NET teams train only those key personnel identified by the gaining command. Units are responsible for subsequent training through training packages supplied by TACOM. NET teams also verify manuals supplied by production contractors to ensure their utility. NET teams will be critical to the successful fielding of FMTV, ESP 2 1/2 Ton, HETS, and PLS vehicles in FY 95.

Training Simulators and Devices.

Driver Skill Trainers (DST). Ten DSTs were fielded in 1993 to support institutional training at Fort Leonard Wood and Fort Eustis. The DST is a generic simulator that emulates the operating characteristics of tractor and trailer combinations. It employs a computer generated imagery visual system and sophisticated math models to create realistic driving environments. A Post Fielding Training Effectiveness Analysis was conducted on the simulators in 1st Qtr FY 94. The study report is at Headquarters, TRADOC, for review. Early indications are that the DST was well received.

Maintenance Panel Trainer (MPT). The U.S. Army Ordnance Center and School utilizes a MPT in its 63-series motor maintenance courses. The MPT aids training in wiring, lighting, DC circuits, diesel engine maintenance, and hydraulic system maintenance procedures for existing and emerging TWVs.

Driver Standardization Program.

Distributed Training Packages (DTPs). The U.S. Army Transportation School, Army Driver Standardization Office developed DTPs to provide field commanders guidance with driver selection, training, and testing. DTPs are Military Occupational Specialty (MOS) immaterial, and contain risk assessment matrixes, lesson plans, instructional aid lists, training area designs, performance tests, and video training programs. Currently, there are DTPs for HEMTT, HMMWV, HETS, Light and Medium vehicles, and PLS.

Computer Assisted Instruction (CAI). A CAI package, consisting of 28 discs, prepares drivers to take the Commercial Driver's License test, now required by every state. The CAI package is available through local Training and Audiovisual Support Centers, Reserve MACOMs and National Guard Adjutant Generals.

SUMMARY

TRADOC, AMC and the Program Executive Officer for TWV have viable training programs in place to ensure fielded systems are properly operated and maintained.

SECTION 6

CONCLUSION

This Army Modernization Plan confirms the goals, objectives, and general fleet direction of Army Modernization Plans since 1989. Changes articulated in this version are principally the result of reduced funding levels. However, the goals of TWV modernization--to provide capable TWV to fulfill battlefield requirements, at an affordable cost of ownership, and improve fleet supportability characteristics--remain unchanged.

TWV funding has continued to decline. POM funding meets less than 30% of required levels and threatens the production base. Specific fleet deficiencies are:

Light Fleet:

- Heavy HMMWVs will fill Force Package 1 and part of Force Package 2.
- Heavy HMMWVs will be insufficient to meet remaining requirements.
- HMMWV replacement or upgrade programs are unfunded.

  CUCV assets stay to an age three times that originally deemed economical.

Medium Fleet:

- FMTV does not fill 50% of Force Package 1.
- Shortages of 5 ton hampers required mobility levels.
- Retention of old 2-1/2 ton payload class results in significant mobility deficiencies and in escalating operations and supply costs.

Heavy Fleet:

- New 70-ton HETS fill Force Packages 1 and 2.
- Insufficient new 70-ton HETS will force the Army to retain older assets for Force Packages 3 and 4.
- Lack of flatracks will not permit full implementation of the Manouver Oriented Ammunition Distribution System (MOADS) doctrine.

• HEMTT shortages for wreckers, tankers and cargo trucks will exist throughout the force.

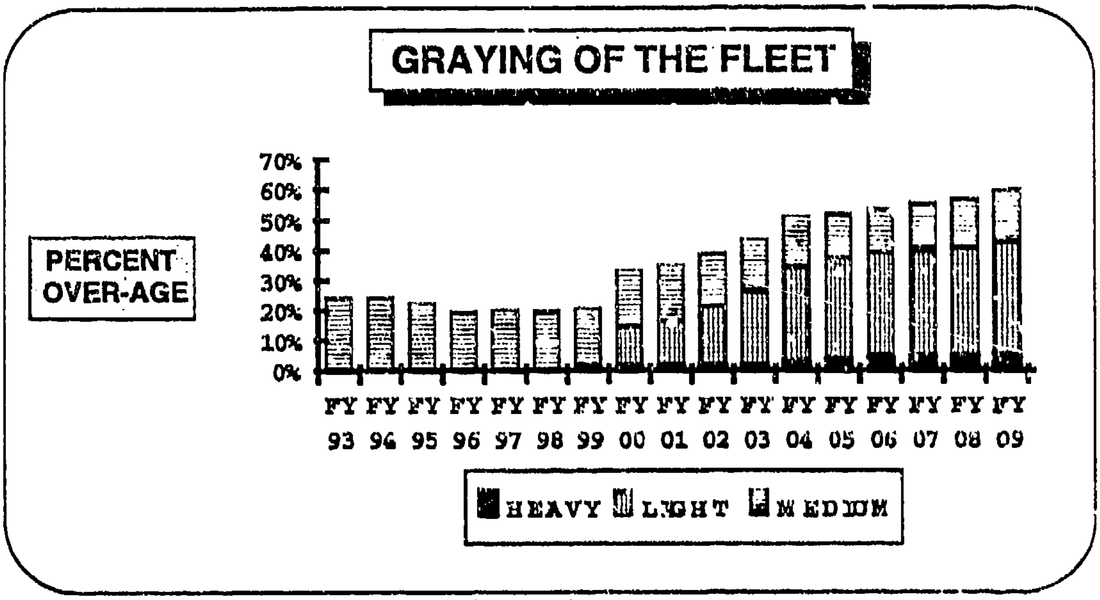


Figure L-23

FLEET AVERAGE AGE 1994 vs END POM/EPA

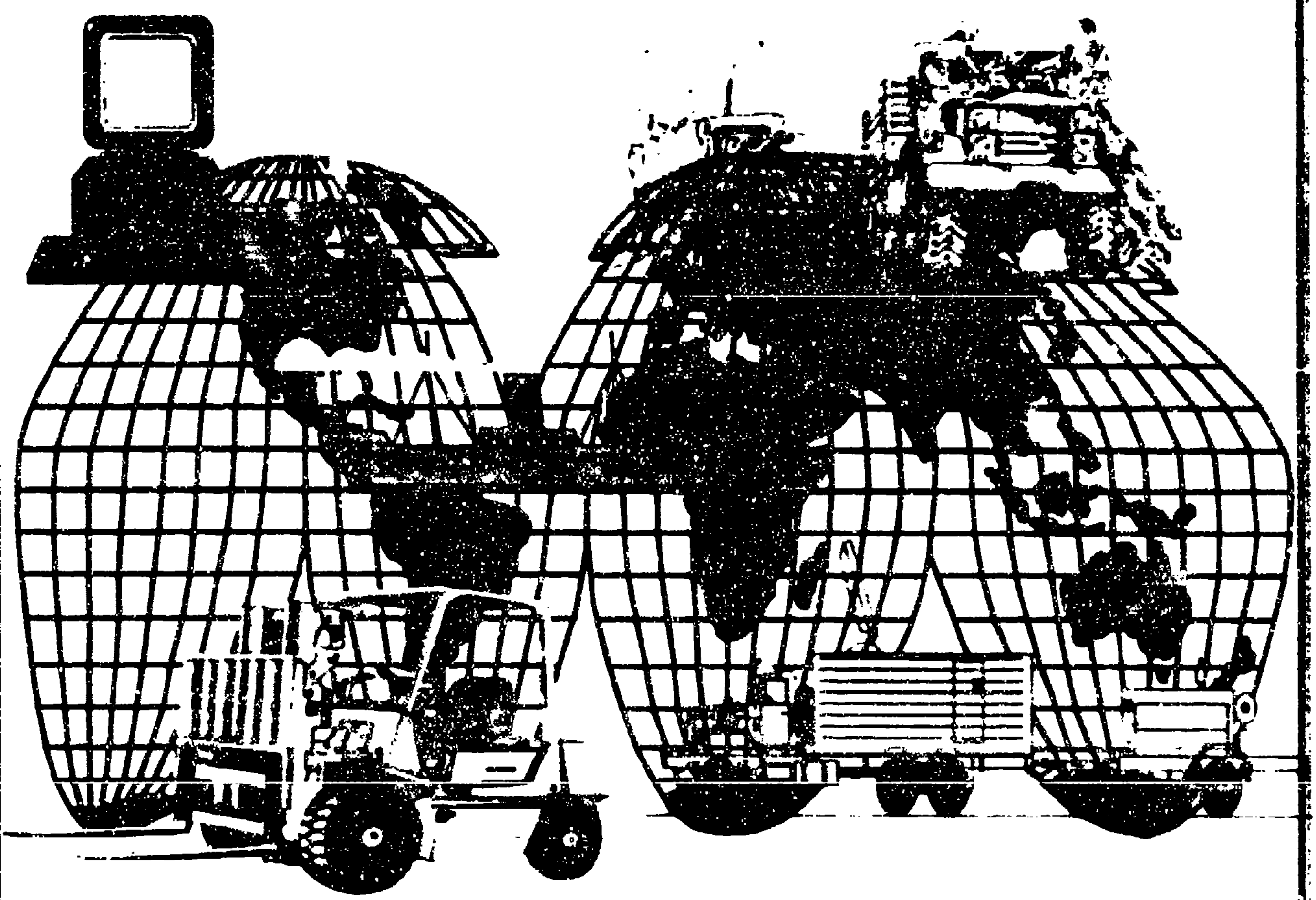
VEHICLE	ECONOMIC LIFE	MAX FLEET AVG AGE OBJECTIVE	FLEET AVERAGE AGE 1994	FLEET AVERAGE AGE 2010
CUCV	12	6.5	7.7	24
HMMWV	14	7	5	15.8
SUSV	15	7.5	6.2	21
M151	15	N/A	16.7	N/A
M880	7	N/A	15.1	N/A
2-1/2 TON	20	10	24.7	23.4
5 TON	22	11	13.0	16.7
PLS	20	10	N/A	15.1
HEMTT	20	10	7.1	17.8
ENG TRAC	20	10	[illegible]	24.9
LINE HAUL	20	10	11.1	25.7
HET	14	7	15.7	20.5
M123	14	7	25.4	NA
TOTAL AVE	17.8	8.9	12.7	18.9

Figure L-24

Figure L-23 reflects how Army TWV fleets age between today and 2009. Figure L-24 displays the EUL of each vehicle, the ideal or "objective age," the current (1994) average, and the fleet age in 2009 based on planned procurements.

ANNEX M

LOGISTICS



ANNEX M

LOGISTICS

SECTION 1

INTRODUCTION

"The word logistics is derived from the title of the MAJOR GENERAL DES LOGIS, an officer whose duty it formerly was to lodge and camp the troops, to give direction to the marches of columns, and to locate them upon the ground."

General Antoine Henri Jomini
Summary of the Art of War

Army modernization must achieve the capabilities needed for Land Force Dominance by ensuring the force can accomplish the following: Project and Sustain the Force; Protect the Force; Win the Information War; Conduct Precision Strike, and to Dominate the Maneuver Battle. This annex focuses on one objective: Project and Sustain the Force. In essence, that is the ultimate goal of logistics. To attain, and maintain, this goal requires modern logistics capabilities. The logistics portion of the Army Modernization Plan sets forth the requirements for, and assessments of, capabilities needed in the near-, mid-, and far-terms. Logistics modernization supports the strategic, operational, and tactical levels of war across the range of military operations. Army logistics is transitioning from an orientation on forward deployed forces to an orientation on force projection forces and operations. This is consistent with the current U.S. National Military Strategy.

This annex integrates a number of Army Long Range Logistics Master Plans, such as the Watercraft Master Plan, as well as the building blocks of the Army Long Range Planning System and the Army Strategic Mobility Program. The logistics modernization strategy is supported by the Army's planning, programming, and budgeting system. Logistics is also discussed in these annexes: Aviation, Combat Health Support, Horizontal Technology Integration and Tactical Wheeled Vehicles.

SECTION 2

WARFIGHTING CONCEPT

"Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act, logistics brings the troops to this point."
General Antoine Henri Jomini
Summary of the Art of War

Logistics supports mobilization, deployment, reception, movement, sustainment, reconstitution, redeployment, and demobilization of military forces across the full range of military operations. Army logistics plays a vital role in all levels of operations -- strategic, operational and tactical (there is no distinguishable separating line among these levels for logistics purposes, however): the goal of logistics at all levels is to deliver effective and decisive combat power focused on the tactical level. The foundation of the Army's logistics modernization objective rests on projecting the force, sustaining the force, and providing core support to the force -- at all levels of operations.

STRATEGIC LOGISTICS represents a subset of national power. It includes the nation's industrial base and its link to military forces. The strategic level of logistics is the purview of DoD, the individual services, and non-DoD agencies. It leverages private sector support for warehousing, maintenance, and materiel management. This alliance closely links the Army to the sustainment base which can potentially achieve significant reductions in Army managed stockpiles of supplies and materiel.

OPERATIONAL LOGISTICS ties strategic capabilities to tactical requirements. It encompasses support required to sustain Army only, joint, and multinational campaigns in any future conflicts from general war to operations other than war (OOTW). The future organizational structure consists of Army Combat Service Support (CSS) units with modernized equipment, augmented by DoD civilians, contractors, and host nation resources. Logistics at this level focuses primarily on reception, discharge, onward movement of forces, positioning of facilities, materiel management, movement control, distribution, reconstitution, and redeployment.

TACTICAL LOGISTICS is the synchronization of all logistics activities that sustain soldiers and their systems. Military units make up the bulk of the logistics organization at this level. However, DoD civilians and contractors also have a significant role to play. Tactical logistics activities are performed by CSS units and by platoons/sections/teams organic to combat and combat support units. Tactical logistics focuses on manning, arming, fueling, fixing, moving, and sustaining soldiers and their equipment. Future organizations will be modular so planners can tailor CSS forces to match deploying force needs.

The Army's mobility objective is to provide a fully modernized, sustainable continental U.S.-based corps with selected echelon above corps (EAC) units that must close no later than 75 days after initial combat. (See figure M-1)

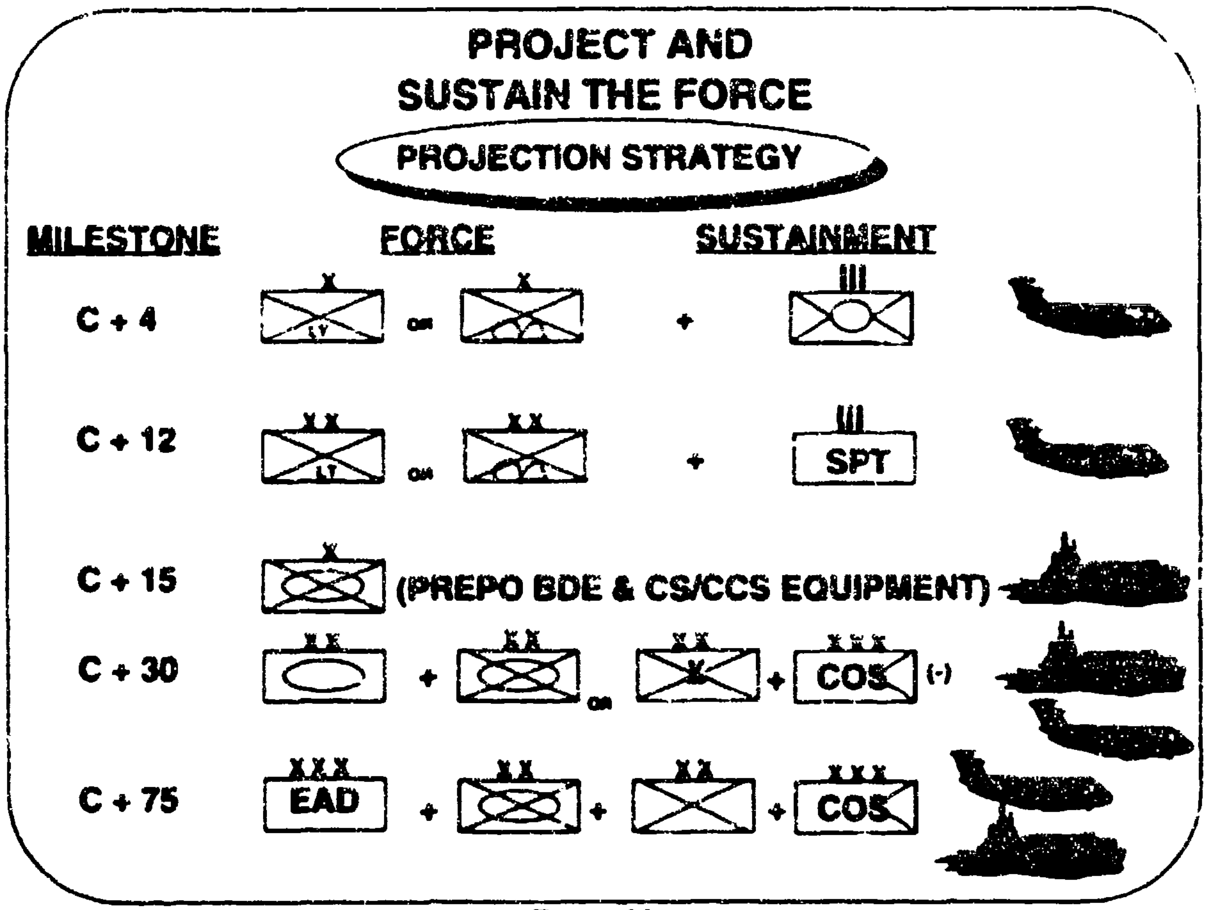


Figure M-1

The success of this force is dependent on a balance between initial sustaining supplies and strategic mobility assets (airlift, sealift, and prepositioned equipment and facilities afloat). Strategic mobility is essential to projecting forces, reinforcing forward deployed forces, and establishing initial sustainment for all forces.

The CSS units of both divisional and echelons above division elements in the continental U.S.-based corps are designed to support the combat and combat support forces of the corps. Moreover, the Army traditionally provides distribution support as well to other services, multinational forces, and, on occasion, directly to civilian populations (during humanitarian aid and in OOTW). These roles are expected to expand. The Army continues to develop doctrine and force structure to effectively and economically provide logistics tailorable for any contingency.

There is need for a single Army-managed logistics headquarters in a theater to orchestrate distribution to all theater forces. CSS units, whether part of a projection

force, a forward deployed force, or a reinforcing force must be fully modernized in order to accomplish their missions.

Split-based operations, a Force XXI concept for CSS elements, are being examined as a potential means of improving the logistical support to force projection operations. In split-based operations, deploying CSS elements use smaller automation devices linked, via highly capable communications, to large scale automated processors at U.S. sustaining bases. This concept may prove to reduce the numbers of CSS personnel/units and the quantity of their equipment in theater, and significantly enhance the mobility and responsiveness of in theater CSS management elements.

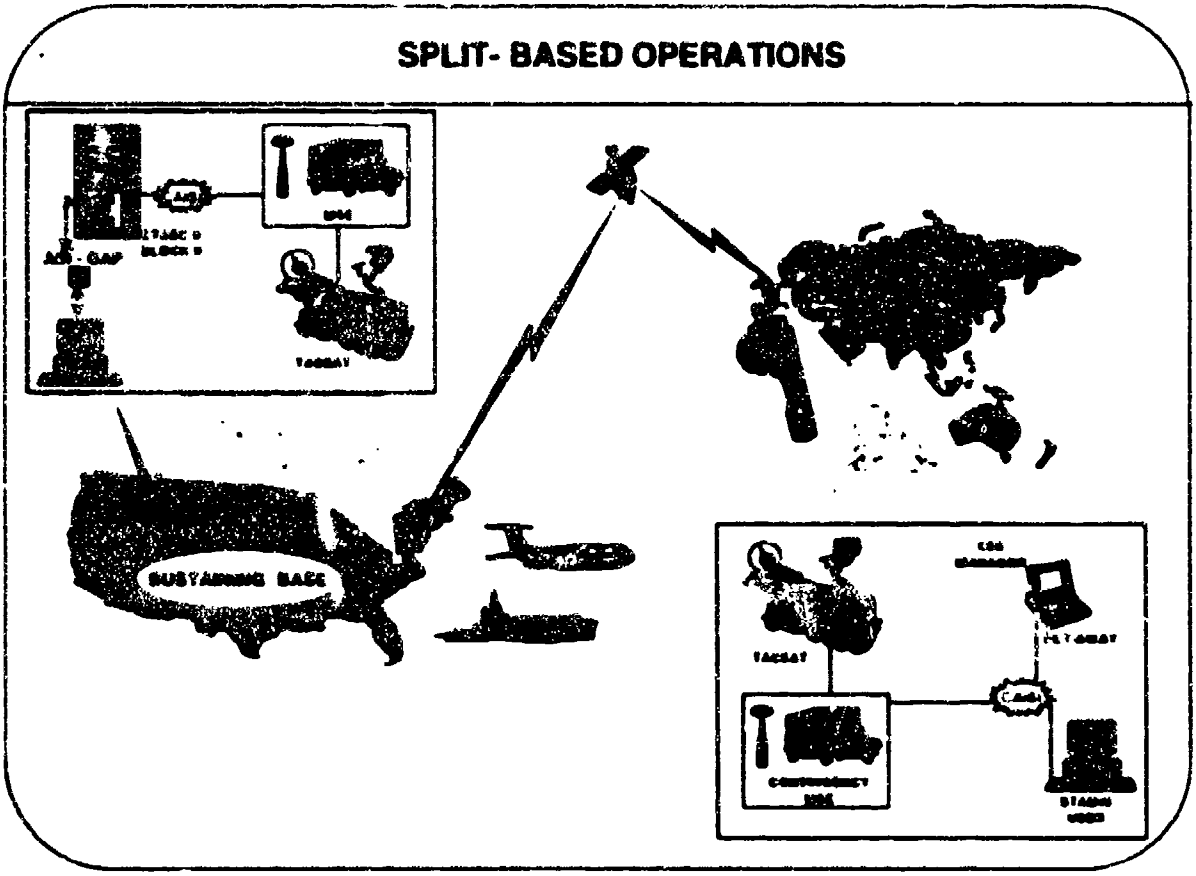


Figure M-2

The following sections document current capabilities, assess program status, and layout research, development and acquisition strategies that combine to achieve the warfighting concepts.

SECTION 3

CURRENT PROGRAM ASSESSMENT

"It is very necessary to attend to all this detail and to trace a biscuit from Lisbon into a man's mouth on the frontier and to provide for its removal from place to place by land or by water or no military operations can be carried out."

Attributed to the Duke of Wellington
Peninsular Campaign, 1811

The logistics capabilities assessment focuses on project the force, sustain the force, and core support to the force. Figure M-3 below reflects the total Combat Service Support (CSS) program (research, development and procurement) minus Tactical Wheeled Vehicles. This depicts a shortfall of almost one billion dollars, across the POM period, for our key CSS programs.

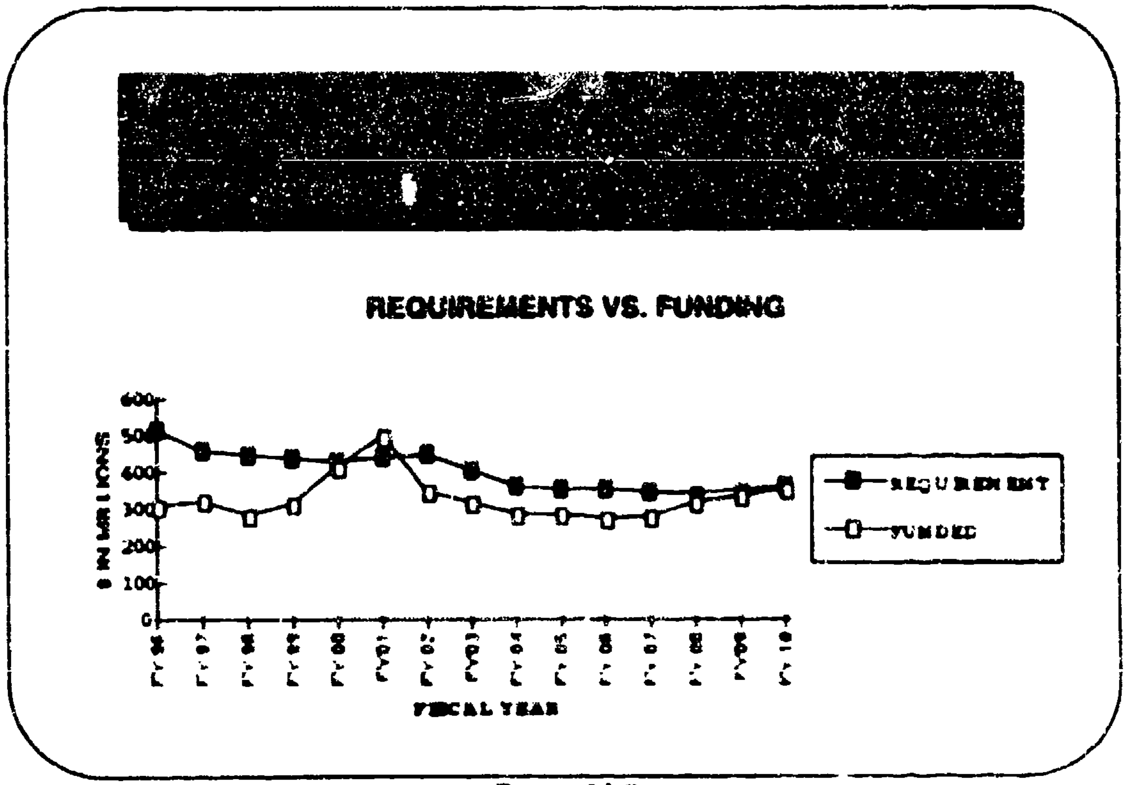


Figure M-3

Projecting the Force encompasses strategic and tactical mobility, and includes all modes of transport and associated transfer of materiel. Personnel, equipment, and supplies must move rapidly, and in sufficient quantities, to support combat operations. Tactical actions require timely concentration of units and materiel, and often demand short notice movement of large forces and major shifts in directions of movement. At

the tactical level, units, supplies, and important facilities must move as battles progress; this to assure responsive support of committed units as large as corps. The movement of personnel, equipment and supplies is, in actuality, a continuum--from the industrial base to the foxhole. The key components of modernization in the force projection area are: deployment outload, airlift, sealift, airdrop delivery, and Logistics-over-the-Shore.

Sustaining the Force encompasses all services to provide water, food, fuel, personnel hygiene, and automation support. The modernization needs focus on battlefield support and improving the quality of life for our individual soldiers. In the area of automation there is a need to improve in transit asset visibility of supplies and equipment. Quality of life systems such as food, water, and shelter affect every soldier's readiness and willingness to fight. The key components of modernization in the sustain the force area are: combat service support control system, corps/theater automatic data processing service center, Phase II, logistics technological systems, objective supply capability, standard Army information systems computers, total distribution, combat service support equipment, Force Provider (a 550 person collective support system), petroleum distribution equipment, tactical rigid wall shelters, and water modernization.

Core Support to the Force encompasses those basic programs necessary to keep the Army operating efficiently. These include procuring sufficient ammunition for training and maintenance of basic levels of war reserves, maintaining the ammunition production base, replacing aged materiel handling equipment, improving power generation equipment, updating test and diagnostic equipment. The key components of modernization in the core support area are: ammunition, explosive ordnanc disposal, Integrated Family of Test Equipment, maintenance equipment, materiel handling equipment, tactical electrical power, and test measurement and diagnostic equipment modernization.

Figure M-4 (below) highlights important aspects of all CSS programs.

AREA	SYSTEM/MDEP	PAYOFF	YEAR(S)	LEVEL
PROJECT	AIRDROP DELIVERY	INCREASED AIRCRAFT SURVIVAL DECREASED DROP ZONE SPREAD	FY 96-10	TACTICAL
	AIRLIFT (C-17)	ACCESS TO 6000 + AIRFIELDS	FY 96-06	STRATEGIC
	DEPLOYMENT OUTLOAD (RAIL CARS/CHE)	SUFFICIENT RAILCARS AND CONTAINER HANDLING EQUIPMENT TO DEPLOY FORCE TO PORTS	FY 96-10	STRATEGIC
	LOGISTICS-OVER-THE-SHORE (LOTS)	INCREASED LOTS FLEXIBILITY	FY 96-02	STRATEGIC OPERATIONAL
	SEALIFT	MOVE TROOPS AND SUPPLIES PREPOSITION ASSETS	FY 96-10	STRATEGIC
SUSTAIN	CSS CONTROL SYSTEM	REAL TIME LOGISTICS INFO	FY 96-04	OPERATIONAL TACTICAL
	CORPS/THEATER ADP	ENHANCED SPLIT OPERATIONS	FY 96-00	OPERATIONAL
	LOGISTICS TECH	IMPROVED ASSET MGT VISIBILITY	FY 96-10	TACTICAL
	OBJ SUPPLY CAPABILITY	REDUCED ORDER/ SHIP TIME	FY 96-10	OPERATIONAL TACTICAL
	STD ARMY INF SYS COMP	IMPROVED ASSET MGT VISIBILITY	FY 96-10	TACTICAL
	TOTAL DISTRIBUTION PGM	ASSET VISIBILITY, IN TRANSIT AND CONTROL	FY 96-10	STRATEGIC OPERATIONAL TACTICAL
	COMBAT SERVICE SPT EQ	IMPROVED FOOD AND SANITATION	FY 96-10	TACTICAL
	FORCE PROVIDER	INCREASE CBT EFFECTIVENESS	FY 96-02	STRATEGIC OPERATIONAL TACTICAL
	PETROLEUM DISTRIBUTION	IMPROVED TACTICAL SUSTAINMENT	FY 96-10	TACTICAL
	TACTICAL RIGID WALL SHELTER	IMPROVED SURVIVABILITY AND TACTICAL MOBILITY	FY 96-10	OPERATIONAL TACTICAL
	WATER MOD	IMPROVE TACTICAL SUSTAINMENT	FY 96-10	TACTICAL
CORE	AMMUNITION	IMPROVED LETHALITY AND SUSTAINABILITY. SUSTAIN INDUSTRIAL BASE.	FY 96-10	STRATEGIC OPERATIONAL TACTICAL
	EXPLOSIVE ORD DISPOSAL	SURVIVABILITY, SECURITY, PERSONNEL SAFETY	FY 96-10	OPERATIONAL TACTICAL
	IFTE	MOBILE GENERIC TEST EQUIPMENT	FY 96-10	OPERATIONAL TACTICAL
	MAINTENANCE EQUIP	SUPPORT READINESS OF SYSTEMS	FY 96-10	OPERATIONAL TACTICAL
	MHE	REQUIRED MATERIEL HANDLING	FY 96-10	TACTICAL
	TACT ELECT POWER	EFFICIENT POWER, SINGLE FUEL, QUIET, LIGHTWEIGHT	FY 96-10	OPERATIONAL TACTICAL
	TMDE MODERNIZATION	MORE ACCURATE, VERSATILE TMDE	FY 96-10	OPERATIONAL TACTICAL

Figure M-4

The programs are assessed in terms of capability or quantity vis-à-vis missions or threat in near-, mid-, and far-terms. Each program is given a rating of **RED, AMBER, GREEN**.

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and

GREEN -- Adequate capability and quantity exists to perform the mission.

LOGISTICS SYSTEMS ASSESSMENT

	SYSTEM/MDEP	NEAR-TERM (FY 95-96)	MID-TERM (FY 97-00)	FAR-TERM (FY 01-09)
PROJECT	AIRDROP DELIVERY	AMBER	AMBER	AMBER
	AIRLIFT (C-17)	AMBER	AMBER	GREEN
	DEPLOYMENT OUTLOAD (RAIL CARS)	AMBER	GREEN	GREEN
	LOGISTICS-OVER-THE-SHORE	AMBER	AMBER	AMBER
	SEALIFT	RED	AMBER	GREEN
SUSTAIN	CSS CONTROL SYSTEM	AMBER	GREEN	GREEN
	CORPS/THEATER ADP SER CEN - II	AMBER	GREEN	GREEN
	LOGISTICS TECHNOLOGY	AMBER	GREEN	GREEN
	OBJECTIVE SUPPLY CAPABILITY	AMBER	GREEN	GREEN
	STD ARMY MGT INFO SYS COMP	AMBER	AMBER	AMBER
	TOTAL DISTRIBUTION PROGRAM	AMBER	AMBER	GREEN
	COMBAT SERVICE SUPPORT EQ	AMBER	AMBER	AMBER
	FORCE PROVIDER	AMBER	AMBER	AMBER
	PETROLEUM DISTRIBUTION EQ	AMBER	AMBER	AMBER
	TACTICAL RIGID WALL SHELTER	AMBER	AMBER	AMBER
	WATER MODERNIZATION	AMBER	AMBER	AMBER
CORE	AMMUNITION	AMBER	AMBER	AMBER
	EXPLOSIVE ORDNANCE DISPOSAL	AMBER	AMBER	AMBER
	INTEGRATED FAMILY OF TEST EQ	AMBER	AMBER	AMBER
	MAINTENANCE EQUIPMENT	AMBER	AMBER	AMBER
	MATERIEL HANDLING EQ	AMBER	AMBER	AMBER
	TACTICAL ELECTRICAL POWER	AMBER	RED	RED
	TMDE MODERNIZATION	AMBER	AMBER	AMBER

Figure M-5

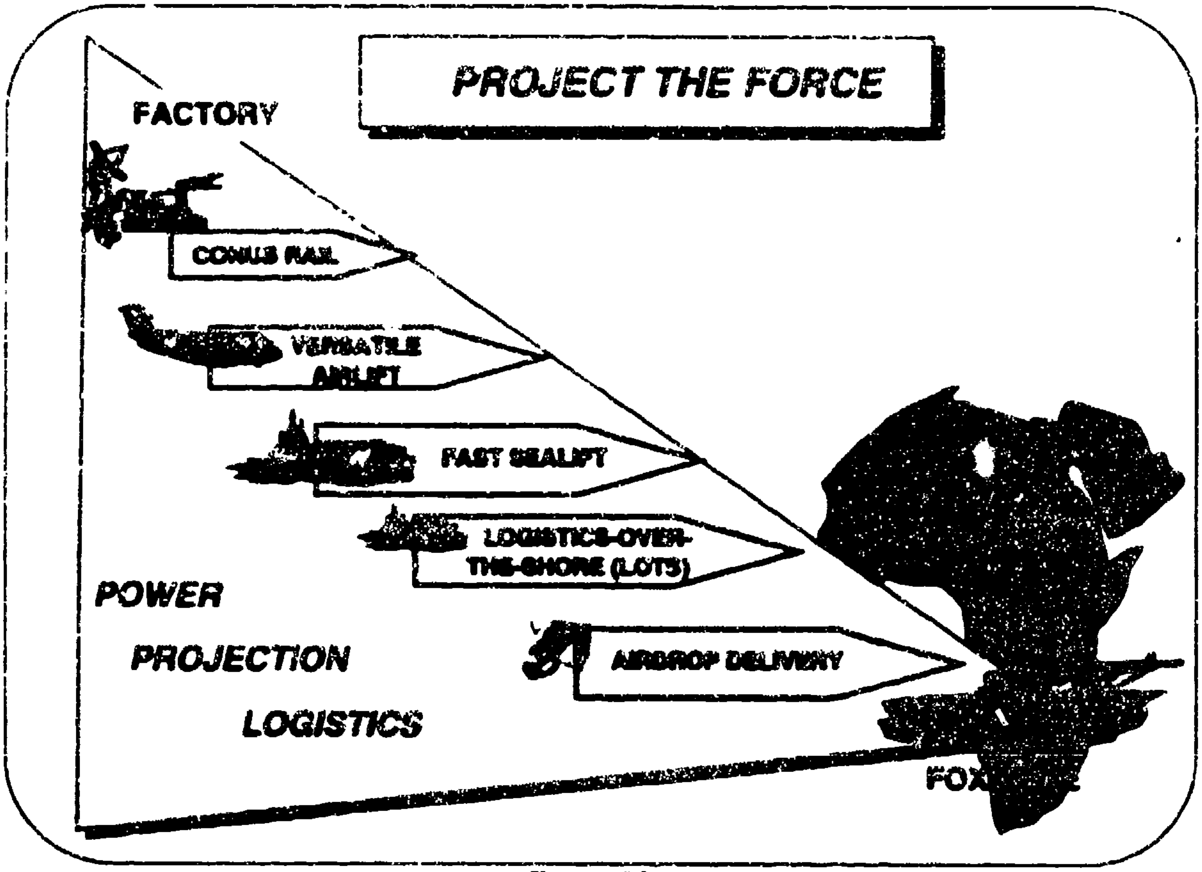


Figure M-6

PROJECT THE FORCE

Airdrop Delivery Systems. Improved airdrop delivery systems are required to increase our force projection capability and to facilitate our ability to sustain all forces throughout the entire range of military operations. Improvements in safety of personnel parachutes are vital to ensure airdrop success. Precision guided cargo systems are required to accurately deliver warfight and sustainment provisions as well as reduce aircraft vulnerability and the numbers of aircraft needed to conduct airdrop operations. Improved airdrop systems increase cargo capability to nearly double the current tonnage capability per aircraft, per pass, thereby maximizing Air Force cargo aircraft capacity and reducing dispersion on the drop zone. Enhancements to cargo and personnel systems are required to: reduce their complexity and labor intensity; improve readiness for war and OOTW; increase the probability that materials delivered will land in usable condition; increase the survivability of aircraft and crew; and, increase accuracy and weight capacity of delivery systems. Low cost, disposable cargo systems are required to reduce the cost of humanitarian aid and disaster relief airdrop operations.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

Assessment for near-, mid- and far-terms is **AMBER** for reasons of inadequate funds for research and development, and procurement. Funding constraints delay research and development of the advance parachute and harness system which requires major safety modifications. The advanced precision aerial delivery system, needed for pinpoint, early entry force sustainment and just-in-time resupply, is not sufficiently funded for required research and development.

AIRDROP DELIVERY SYSTEM

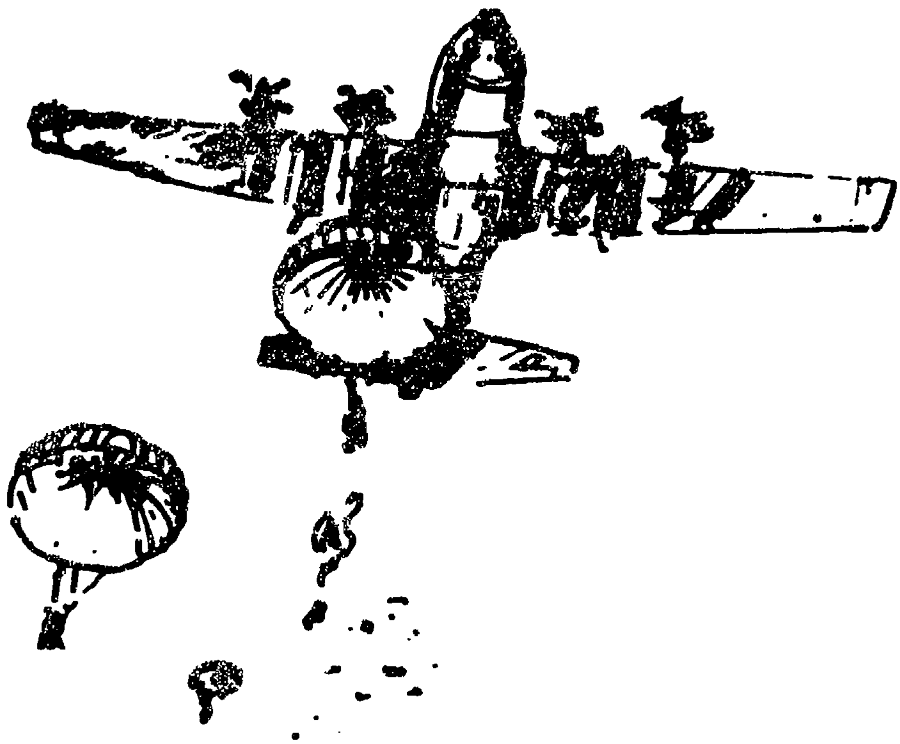


Figure M-7

Airlift. Our nation's airlift assets are aging. Further, they do not meet the full range of force projection needs. The C-17 offers the best opportunity to ensure continued, responsive strategic airlift for our Nation's contingency forces. The C-17 quickly delivers forces directly into a theater, and offers the likelihood of inserting those forces closer to where they are needed (no current aircraft have this capability). The C-17, a key strategic airlifter, is operated by the Air Force Air Mobility Command, the air component of U.S Transportation Command. The C-17 is an Air Force Program, but

the Army sponsors the C-17 Test Office (the Army on-site representative to the Air Force), and is firmly committed to the continued acquisition of the C-17.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	GREEN

The near- and mid-terms are **AMBER** due to the lack of adequate airlift. The Air Force plan to buy the full requirement of 120 planes is in jeopardy due to cost. The Air Force is consider ng a nondevelopmental aircraft as a hedge against a smaller buy of C-17s. The Army supports the full buy of 120 C-17s. If funding is restored for the 120 planes, the far-term assessment will be **GREEN**.

Deployment Outload Rail Cars. Rail cars are required at predetermined locations for initial outload of the first deploying units and equipment. Commercial rail carriers cannot provide needed equipment in less than seven days of mobilization (M-Day). Various types of rail cars are required for Force Package 1. Requirements include cars prestaged at the installation of the initial Ready Brigade, commercial cars for the tank plant, free running system rail cars, and rail cars for depots.

1,845 rail cars are required for Force Package 1. Currently 689 are on hand or on contract. The remaining rail cars required are programmed to be procured by FY 01.

Container Handling Equipment (CHE) capability at installations is currently inadequate to meet container/intermodal movement requirements from the installations. Installation CHE requirements are currently unfunded, reinforcing the **AMBER** rating for this area.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

This is an integral part of the Army Strategic Mobility Program. While the projected budget fully supports the rail car procurement for Force Package 1, thus being rated **GREEN** for mid- and far-terms, the near-term program is **AMBER** due to current on-hand shortages.

Logistics-over-the-Shore. The Army has a requirement to maintain the capability to discharge personnel and equipment from vessels not in fixed ports. This is called Logistics-over-the-Shore. Such loading and unloading operations are conducted over unimproved shorelines, through partially destroyed fixed ports, through shallow draft ports not accessible to deep draft shipping, and through fixed ports that are inadequate for other reasons but accommodate this capability. Logistics-over-the-Shore equipment requirements include floating cranes, pusher tugs, upgraded lighter amphibious resupply cargo boats (LARC60), and causeway systems. It does not include comm nd and control boats.

The Logistics-over-the-Shore programmed procurements, from FY 96 to FY 01, are three floating cranes, seven pusher tugs, 19 causeways, and 23 lighter amphibious resupply cargo boat upgrades. The Army Reserves fund one floating crane and two pusher tugs. These procurements satisfy currently known requirements. A government contractor is validating Total Army requirements (previously identified in the Army's Watercraft Master Plan). The requirement for 19 coastal harbor inland boats is unfunded, and is not reflected in the latest POM or Long Range Research Development and Acquisition Program. Figure M-8 shows a detailed comparison of equipment requirements, equipment on-hand, and projected equipment funding.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program for near-, mid- and far-terms is **AMBER** due to no on-hand roll on/roll off discharge causeways, ferry causeways, and pier causeways. These causeways are a critical link between vessels and beaches or port facilities.

	SYSTEM	RQMT	EXISTING	POM	POM CHANGES OR COMMENT
SHIP HANDLING & DISCHARGE	RO/RO DISCHARGE CAUSEWAY	6	NONE	6	NO PLUS-UP $13.4M CUT FROM FY 96
	TUGS				
	100 FT	16	25	NONE	NO PLUS-UP ON CUT
	128 FT	6	6	NONE	
	CRANES				
	100-300 TON	6	NONE	3	USAR PROCURING 1
SHIP TO SHORE MOVEMENT	*TUGS*				
	45 FT	0	2	NONE	RETAIN IN LIEU OF PUSHERS
	65 FT	0	15	NONE	RETAIN IN LIEU OF PUSHERS
	PUSHER	12	NONE	5	2 FOR USAR IN DPP
	LCUs				
	LCU-2000	35	35	NONE	
	LCU-1600	13	13	NONE	
	LCMs				
	LCM-8-MOD0	9	28	NONE	
	LCM-8-MOD1	77	96	NONE	
	LARC-LX	23	23	NONE	14 UPGRADED IN POM
	LSVs	6	5	NONE	ONE FY 96 DELIVERY
	CAUSEWAYS				
	FERRY	6	NONE	6	
	PIER	5	NONE	5	POM AND PRIOR YEARS MEET REQ
CMD & CNTRL/ LOGISTICS	*COASTAL HARBOR INLAND BOATS*	19	NONE	NONE	REQUIREMENT NOT REFLECTED IN POM OR LRRDAP
	FERRY HARBOR	1	3	NONE	
	PATROL BOATS	6	10	NONE	
	J/OT BOATS	1	7	NONE	
	FMS	3	3	NONE	

Figure M-8

Sealift Capability. The Army is committed to supporting the U.S. Navy's acquisition of strategic sealift as outlined in the Mobility Requirement Study. The Army's sealift requirements are grouped by category: surge sealift, afloat prepositioned vessels, and sustaining sealift. Surge sealift are those vessels that move two heavy divisions to overseas locations. These vessels must move forces in no more than 15 days with no more than 1/9th of a division at risk on any one ship. The Army's surge sealift requirement is: eight fast sealift ships, 11 large medium speed roll on/ roll off vessels, and 29 roll on/roll off vessels (new construction or conversion). Vessels for afloat prepositioning of supplies can be met initially by using large militarily useful vessels, from the commercial market. Final configuration requires nine large medium speed roll on/roll off vessels, two container ships, three lighter aboard ships, and two float on/float off ships. Finally, the sustaining sealift shipping must be capable of establishing a sea line of communication within 30 days; this can be met by a combination of ready reserve force sealift and chartered commercial ships (to include foreign vessels). Strategic sealift assets are operated by the Military Sealift Command (MSC), a component of U.S. Transportation Command.

NEAR-TERM	MID-TERM	FAR-TERM
RED	AMBER	GREEN

Near-term program is **RED** due to the lack of dedicated, or available, surge, afloat prepositioning, and sustainment sealift. This condition will improve upon receipt of the five container ships currently being converted to large medium speed Roll on/ Roll off ships and seven additional ready reserve force Roll on/Roll off ships currently being procured. As a result, the mid-term will be **AMBER** and the far-term **GREEN**.

The overall assessment of the five programs in the **PROJECT** category is **AMBER**.

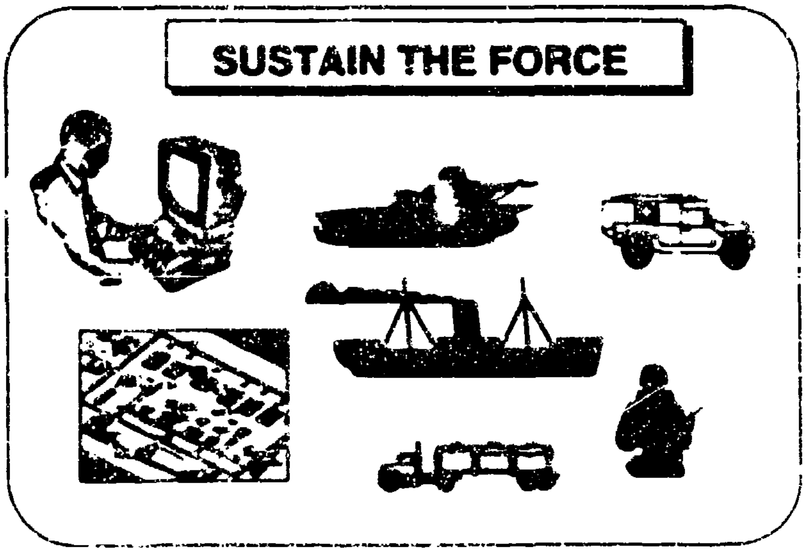


Figure M-9

SUSTAIN THE FORCE

Automation/Combat Service Support Control System. The Combat Service Support Control System is one of the five principal control nodes of the Army Battlefield Command System. It supports the planning and decision-making processes of theater and tactical force commanders, and also provides an integrating capability among other Army Battlefield Command System nodes. The Combat Service Support Control System replaces an unstructured, slow, labor-intensive manual system not at all responsive to present day battlefield command and control requirements. The new system can rapidly collect, correlate, analyze, and provide quality near real time logistical, medical, financial, and personnel information to combat service support, theater, and force level commanders and their staffs. The Army Battlefield Command System cannot fully achieve the objective force level operational capability until the Combat Service Support Control System is fielded. Fielding to the contingency force will occur by FY 01.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

The near-term program is **AMBER** due to extended procurement duration. Reduced procurement slows the conversion to integrated, automated decision-making capabilities, and then causes combat service support commanders in Force Package 3, Army National Guard, and Army Reserve units to use less efficient, slower, manual information management tools now in these units. Program for mid- and far-terms will increase procurement, hence the **GREEN** rating.

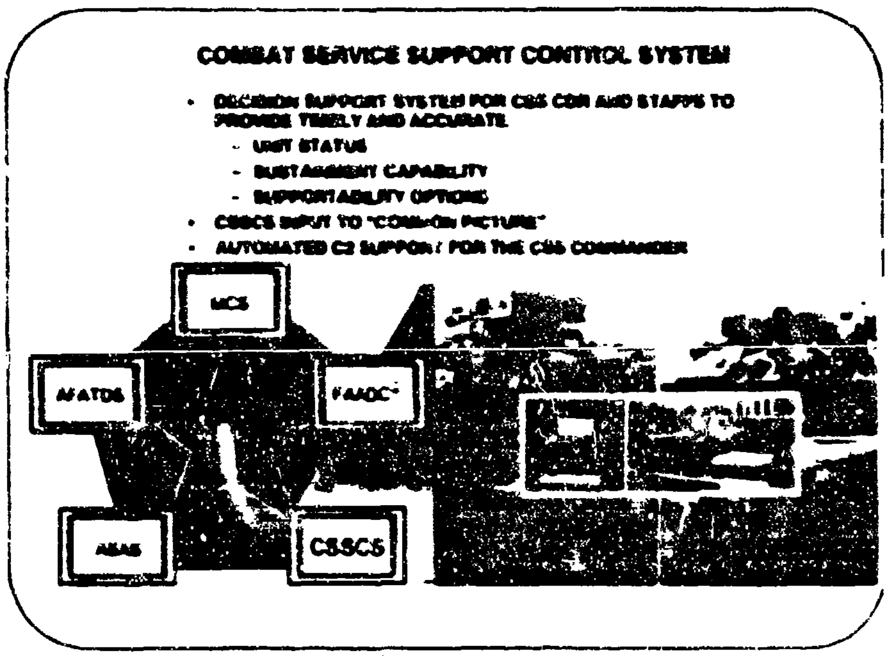


Figure M-10

Automation/Corps/Theater Automation Data Processing Service Center - Phase II. The Block I Corps/Theater Automation Data Processing Service Center-Phase II is a ruggedized, tactical, general purpose computer system designed to provide information processing support for logistical and medical combat service support applications at corps and EAC levels. This system consisting of three commercial utility trucks, three trailers, a tent, a minicomputer, and remotes, provides a mobile, survivable, and transportable data processing service center for tactical combat service support units. Block I systems are fielded on this configuration. The software used in this configuration is the standard Army retail supply system and the Army medical management information system. This system currently replaces some decentralized automated service support systems. Because of this system, all corps/theater automation data processing service centers - Phase I will be deleted from the Army's automation inventory.

Block II has an upgraded minicomputer and a split-based operations configuration. Split-based operations and fly away capability consists of a mini-computer at the sustainment base connected by various communications modes to microcomputers and laptops in the area of operations. Fly-away boxes provide corps-wide asset visibility and a remote query capability. The concept reduces transaction time and the number of personnel needed in forward support areas to conduct supply and maintenance support actions. Further experimentation is planned for logistics automation of continental U.S.-based support.

The Corps/Theater Automation Data Processing Service Center - Phase-II represents improved information processing and storage capabilities, increased tactical deployment capability, and lower manpower requirements than existing decentralized automated service support systems and corps/theater automation data processing service centers - Phase I systems.

The Corps/Theater Automation Data Processing Service Center - Phase II program is unfunded after FY 95. Block I version of the system has been fielded to the Total Army for medical information software and to Force Packages 2 and 3 for supply information software. Corps/Theater Automation Data Processing Service Center - Phase II, Block II, a component of split-based operations, is to be fielded to the Force Package 1 in 4th Qtr FY 95 after initial operational test and evaluation. Currently it is undecided whether other split-based operations will be funded as part of the Total Distribution Program (TDP).

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

The near-term program is **AMBER** since funding of split-based operations configuration is uncertain. If funding is restored in the future, assessment will be **GREEN**.

Automation/Logistics Technological Systems. Logistics technological systems are the tactical portion of the automatic identification technology programs. The program consists of logistical markings and symbols and microchip integrated technology.

Logistical markings and symbols consist of microcircuit technology for logistics applications such as bar-coding and other symbologies. Logistical markings and symbols are used to input data to the standard Army management information system via bar-codes on materiel. Issue, receipt, and storage transactions are recorded by bar-code readers. This system used in conjunction with advanced computer technology, satellite tracking, and satellite communications, significantly enhances the capability for in transit and total asset visibility. Current logistical markings and symbols equipment in the field is being replaced by the newer equipment. Funding covers the Total Army.

Microchip integrated technology is part of the automatic identification technology. Automatic identification technology is a family of data-capturing devices which combine various technologies, such as, bar coding and other symbologies, microcircuit technology, and voice recognition, to provide rapid and accurate acquisition, retention, and retrieval of source data in support of automated information systems. Automatic identification technology includes peripheral hardware such as printers and disk drives.

The U.S. Air Force is the executive agent for microchip integrated technology -- automated information technology. Currently, funds are programmed to purchase 8,000 tags, 350 hand held interrogators, and 100 fixed interrogators for the Army. This increases the capability for in transit and total asset visibility as part of the Total Distribution Program. These items support the Contingency Corps.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

The near-term program is **AMBER**. The logistical markings and symbols program support Total Army fielding. The equipment can be replaced on a five year cycle. However, due to funding constraints, microchip integrated technology only supports the Contingency Corps. The assessment becomes **GREEN** in the mid- and far-terms when the Total Army is fielded with microchip integrated technology.

Automation/Objective Supply Capability. Objective Supply Capability is attained through software modifications to existing Army standard retail supply systems creating a near real time requisitioning capability down to the unit level. Objective Supply Capability reduces order-ship-time for materiel, transportation costs, stock fund expenditures, delivery time, and inventory costs. Administrative delays are eliminated. It also provides logistics managers improved asset visibility and the capability to laterally redistribute retail assets within a prescribed geographic area. It is presently designed for use in nontactical environments.

Phase I fielding to the sustaining bases, and to Army National Guard and Reserve bases, was completed in FY 94. Phase II is currently underway; software is being developed for integration into the Standard Army Retail Supply System (currently in the Contingency Corps). A software acceptance test is set for 4QFY 95. Concurrent with Phase II development, objective supply capability is being modified to be fully compatible with total asset visibility. The fielding schedule for objective supply capability in Phase II depends on the development and fielding of the Standard Army Retail Supply System. Completion of Standard Army Retail Supply System fielding is scheduled for FY 96.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	GREEN	GREEN

The near-term program is AMBER; the Contingency Corps does not have the objective supply capability at present. However, the Contingency Corps acquires this capability when the standard Army retail supply system is completely fielded in FY 96. At that time the mid- and far-terms assessments become GREEN.

Automation/The Standard Army Management Information Systems Computer Platform. The Standard Army Management Information Systems uses a group of nondevelopmental computer systems. This program, an evolution of the Army tactical computer program, provides follow-on systems in support of combat service support missions. The Standard Army Management Information Systems computer platform replaces the current tactical Army combat computer systems, some decentralized automated supply service systems, and manual systems. These systems are transportable and user friendly. Nondevelopmental commercial computers are used in a tactical environment at various echelons with electronic communications capability. These systems provide improved accuracy, timeliness, handling, and transmission of personnel, logistical, and medical data (compared to manual systems). The near-term (FY 95-96) intention is to field to Force Packages 1 and 2. The far-term goal is to field to the Total Army. Current funding completes fielding by FY 01 (vice FY 99, the optimum).

Limited procurement slows the progress of linking computer hardware upgrades with the software upgrades. Currently, requests are neither timely nor accurate due to the absence of real time systems interfaces and information sharing among existing systems. "Swivel chair operation" creates bottlenecks; human operators must extract data from one system and key it into another. Users of the current automated systems must use couriers to transport floppy disks across the battlefield to perform combat service support missions. Where automation exists today, the flow of information is impeded by a mix of various computer hardware systems, software languages, and operating systems, as well as by the lack of communications from users in the forward areas to the CONUS. Various major and special commands have developed their own unique systems to support combat service support; however, these systems do not interface with the standard systems.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

For the near-, mid-, and far-terms this program is **AMBER** due to procurement limitations which extend the optimum five year replacement cycle to a seven replacement year cycle.

Automation/Total Distribution Program. The Total Distribution Program is a significant logistics modernization initiative which corrects deficiencies in the theater distribution process (these surfaced during Operation Desert Shield/Storm). The Total Distribution Program bridges the seams among strategic, operational, and tactical logistics; it provides total visibility of all assets from industrial base to the end user, using upgraded communications, automation identification technology, and efficient distribution management practices. The Total Distribution Program (TDP) consists of 24 separate programs critical to the success of TDP itself. The programs are discussed in other sections of this annex and in other annexes.

The Total Distribution Program (TDP) allows technology insertions such as the Total Distribution Advanced Technology Demonstration, to take advantage of existing programs. The Total Distribution Advanced Technology Demonstration creates displays of near real time situations for the logistics decision-maker at strategic, operational and tactical levels. Three dimensional mapping improves planning and execution during mobilization, deployment, sustainment, and redeployment. Key logistics data systems are integrated, providing real time tracking of combat essential materiel. Finally, infrastructure assessment and automated movement planning is used. This technology permits logisticians "to see" worldwide logistical resources, and offers logistics decision-makers capabilities to conduct course of action analyses to support planning and execution of operations.

The TDP has funds programmed to resolve six specific issues:

1. Mobile gateway vans are information processing centers that use mainframe, minicomputer or microcomputers, and satellite terminals. These gateways interface with digital data distribution networks, such as fiber optical networks and computer modems which input data. These gateways allow the transmission of logistical data via mobile subscriber equipment voice circuits, bypassing the tactical packet network side of the mobile subscriber equipment. Thus, tactical units are able to tie directly into an unclassified military network. The data are then sent via satellites and other data transmitters to the continental U.S. to inventory control points, depots, and garrisons. These mobile gateways can be moved to different ports. A total of 10 are to be built - two per corps, plus two to be fielded at echelon above corps. The echelon above corps units were fielded by December 1994. Fielding of remaining eight is scheduled for FY 95-96. This will cover the Total Army.

2. Split-based operations and fly away capability involves a minicomputer located at a sustainment base connected, by various communications modes, to microcomputers and laptops in an area of operations. The program is currently being funded by the Corps\Theater automatic data processing service center - Phase II program. This program includes the Contingency Force. If this program is funded, it will cover the follow-on split-based operations concept for the Total Army after FY 95

3. Combat service support automated information system interfaces and block asynchronous transmission software, are designed to electronically exchange information with other tactical and sustaining base automation systems. Under the Standard Army Management Information Systems computer program, 25 developmental interfaces were built for testing, and 23 tactical interfaces were built, in FY 94, for the Contingency Force. Sixty-five interfaces to cover the remainder of the Contingency Force and the training base are funded by this program. The program funds the Army National Guard and Reserve forces, and pays for all maintenance costs/upgrades.

4. The Army is modernizing its EAC communications systems via digital technologies. However, for the communication pathways and networks to work, tactical area communications systems are needed. Integral to these systems are large capacity switches that direct both voice and data through circuit and packet switching. The Army is modernizing 49 of a required 66 switches; 17 switches need to be upgraded.

5. Total asset visibility/in transit visibility displays the quantity of items, where they are located, and how many are in transit to what destination. Total asset visibility is achieved via software; in transit visibility is achieved via microchip integrated technology--automated information technology. Total asset visibility software is being installed throughout the Army at installations, depots, and arsenals. Microchip integrated technology consists of radio frequency tags, magnetic strips, laser cards, bar-code dimensionals with appropriate interrogators, readers, and software interfaces. Fielding goes first to the sustaining base and 7th Transportation Group, and then to the Contingency Force transportation units followed by the remainder of the Contingency Force, and finally to Force Package 2. The Total Army is fielded by FY 00.

6. Microchip integrated technology--automated information technology--was discussed in the logistics technology area.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	GREEN

The near- and mid-terms programs are AMBER since Force Packages 3 and 4 are not being fielded. The Army National Guard and Reserves will be upgraded after

FY 01, thus the far-term will be GREEN. Total distribution management cannot be effective using the current incompatible systems--hardware, software, operating systems, and computer language.

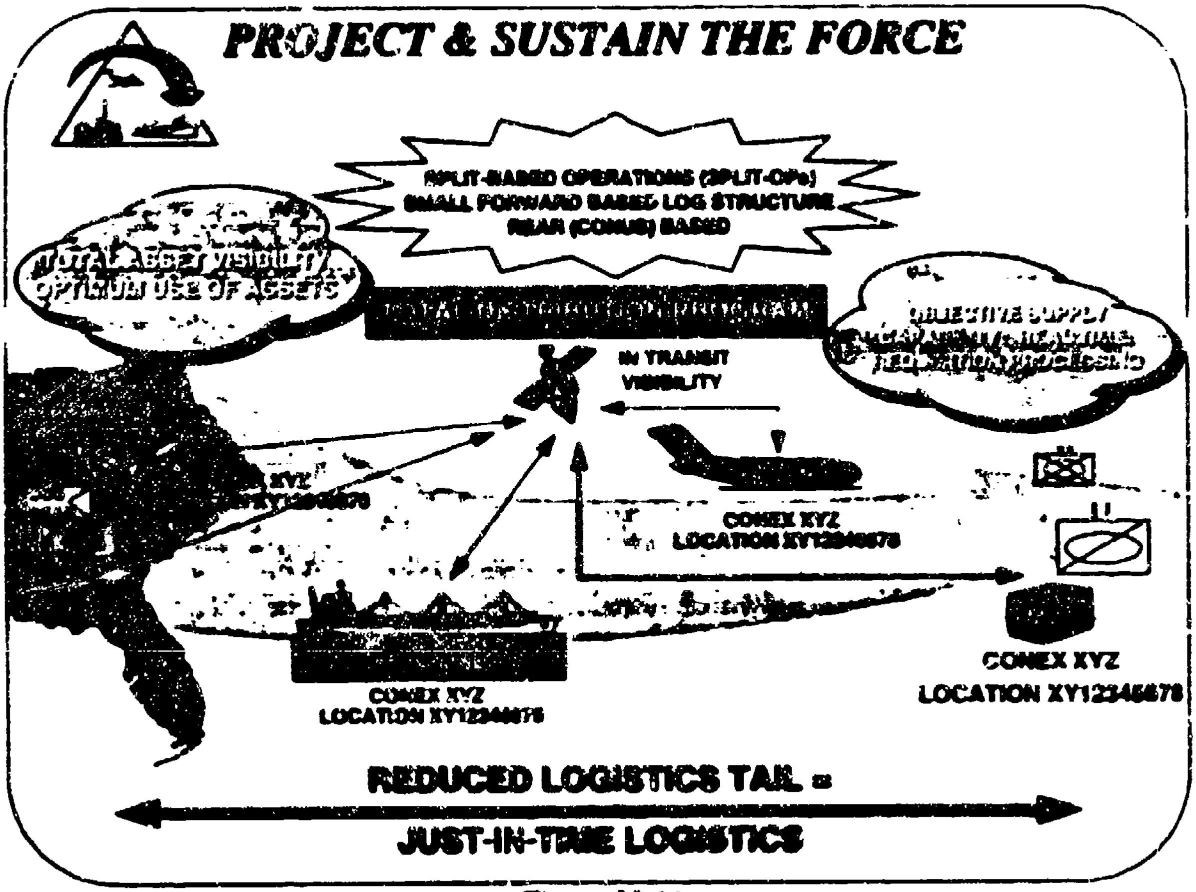


Figure M-11

Combat Service Support Equipment. Combat service support equipment provides personnel life sustainment systems that are essential to maintaining soldier welfare. It includes the laundry and dry cleaning system, the family of space heaters, and the containerized laundry and personnel clothes cleaning system.

The laundry and dry cleaning system, now in research and development, is a nonaqueous field laundering system that uses a commercial dry cleaning solvent to clean approximately 400 pounds of clothing per hour. This system consists of two 100-pound dry cleaning machines mounted on a dedicated M-87 trailer, hauled by an FMTV tractor and powered by a 60KW generator. One system will replace four current laundry units. The system will be authorized to a field service company, a corps unit designed to support soldiers as far forward as practical.

The Family of Space Heaters Program, now in research and development, consists of four heaters: space heater-small, intended for use with the soon-to-be-

fielded soldier crew tent; space heater-Arctic, for use in Alaska and other cold climates replaces the current Yukon Stove; space heater-medium, for use in general purpose and TEMPER Tents; and space heater-convective, for use in the command post system modular (SICPs tent) and other applications that require accurate temperature control (it uses a self-powering thermoelectric unit). These heaters burn cleanly, efficiently, and safely the variety of fuels available on the battlefield, and obviate the need for external power sources.

The containerized laundry and dry cleaning system, also in research and development, is a new equipment program starting in FY 95. It consists of nondevelopmental, self-service type washing machines and clothes drying equipment, as well as currently fielded components of the clothing repair system requirement. Together this equipment provides soldiers in rear areas the capability to clean and repair their clothing at a single location.

Soft shelters support the warfighter in all areas of the battlefield from forward reconnaissance patrols to rear staging bases. Missions include backable tentage for soldier forward teams, crew tents for wheel and track based fighters, command posts, general purpose tentage (for billeting, showers, food service, laundry), chem/bio hardened tentage for medical hospitals, maintenance tents, solar shades, and ballistic covers.

Soft shelters must provide protection from climatic extremes as well as numerous battlefield threats, while providing good life cycle economy. All the above missions must be accomplished when required, independent of the weather or time of day. Transport weights and cubes need to be minimal. Erection and sustainment of soft shelters must be simple and expeditious. The lessons learned during Desert Storm were that many of our soft shelters were inadequate; they remain so today.

Current programs include the Large Area Night Maintenance Shelter, Modular General Purpose Tent System (a replacement for the old GP tents), Transportable Helicopter Enclosure, Lightweight Maintenance Tent, Ballistic Protection System, and Modular Ammunition Solar Shades.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is AMBER for near-, mid-, and far-terms. Funding shortfalls slowed the research and development of the laundry and dry cleaning system and soft shelters. In the far-term additional funding is required to continue the laundry and dry cleaning system and soft shelter modernization program.

Force Provider. Force Provider is a modular, air transportable "tent city" which can accompany soldiers to areas of the world where little or no infrastructure exists. Force Provider offers up to 550 soldiers a place to rest and recuperate from the rigors

of combat, and it can support humanitarian aid missions or disaster relief efforts. But Force Provider is much more than a soldier rest and refit area; while staying in Force Provider, soldiers will have hot meals and showers, use clean bathrooms and receive laundry services. They sleep in climate controlled tents and have a full range of morale, welfare and recreational facilities available; these might include satellite television, recently released movies, a library, a shopping facility which provides limited food items and ample toiletry items, and access to commercial telephones where they can make calls to loved ones. Other facilities will provide a variety of sports activities, each Force Provider module, comes complete with all necessary equipment to operate independently from other Army facilities.

Thirty-six Force Provider modules are required to support the Contingency Force. Of this total, only 13 new modules are programmed through FY 01 due to budget constraints. To offset this, while the objective systems are being procured, 12 modules with similar but not quite equal capabilities have been assembled from existing inventory/production.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

The program is **AMBER** through the far-term due to a shortage of Force Provider modules. Including the continued use of the twelve interim modules, 69% of the requirement (25/36) is filled through FY 01 and 75% (27/36) through FY 10.

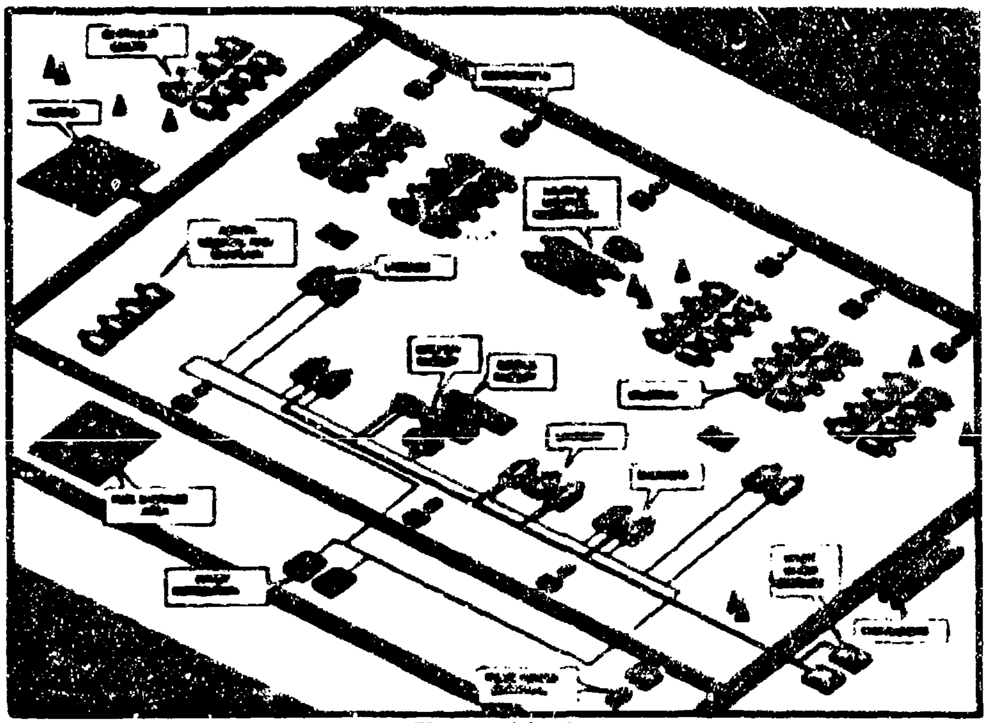


Figure M-12

Petroleum Distribution Equipment. Petroleum distribution equipment provides the Army capabilities to perform vital battlefield sustainment operations inclusive of: receiving and transferring petroleum from tank trucks, tank ships, and rail cars to storage facilities; permanent and temporary storage of petroleum to meet a variety of contingency and site requirements; land transfer and required movement of petroleum between storage mediums, cross-country to and within corps and division areas of operations; filtration and separation processes to remove solids and water from petroleum fuels; quality assurance and surveillance testing of petroleum fuels; and, dispensing in support of tactical and forward area warfight operations (inclusive of rapid refueling of division and corps airfields). Systems to accomplish such operations include: the inland petroleum distribution system; fuel system supply point; forward area refueling equipment; tanker aviation refueling system; Arctic forward area refueling system; tank and pump units; and a variety of fuel pumping assemblies and collapsible fabric tanks.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is **AMBER** for near-, mid-, and far-terms due to funding shortages of the inland petroleum distribution system; this critically hampers multitheater operations in southwest Asia and Korea. In addition, current resources only support 80% of required Contingency Corps hoseline operations. Further, there is insufficient capability to rapidly test joint and multinational force fuels. Additional funds are needed for a petroleum quality analysis system, a tactical fuel distribution system, aviation forward area refueling systems, and Arctic refueling and supply equipment; all to negate battlefield delays resulting from fuel contamination.

Tactical Rigid Wall Shelters. Rigid Wall Shelters are an essential operation and support item in Army-wide modernization, providing a high quality workspace capable of sustaining, protecting, and transporting new and existing systems on the digitized battlefield. Shelters sustain a wide variety of Army systems in all climates and against many battlefield threats. For example, shelters provide a survivable and protected environment during chemical agent attack; provide protection against the effects of electromagnetic interference; and provide the mobility and transportability required for strategic and tactical deployments. A large number of Army battlefield systems depend on the capabilities of rigid wall shelters; such systems include command and control, medical, communications, maintenance, and field feeding. Sister Services rely on the Army's rigid wall shelter program, and benefit from the Army's shelter technology and production expertise.

Completing development in FY 95 is the Electronic Magnetic-protected shelter and the Modular Extendable Rigid Wall Shelter which provides a solid, tactical 20 x 55 ft. field shelter. Current development programs include the Chem/Bio Protected Shelter which provides a rapidly deployable, hybrid, rigid/soft shelter for forward medical treatment. Cargo Bed Covers which provide a durable, low cost, securable field

enclosure for vehicles and trailers, and the Standardized Integrated Command Post System which provides small and large shelters integrated with power, environmental control, rack lights, and a command post tent for tactical command and control systems.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is AMBER for the near-, mid-, and far-terms due to inadequate research and development (R&D) funding for current and future programs, and production funding. Additional R&D funding is needed to maximize shelter survivability against increasing threats, to incorporate preplanned product improvements, and to reduce shelter signature. Inadequate production funding limits fielding the Chem/Bio Protected Shelter to only 50% of the Contingency Force requirements.

Water Modernization. The Army is the executive agent for water production and distribution. To accomplish this mission effectively, improvements in water support and sustainment are required; for example, faster bulk distribution of water to unit trains and logistics transfer points, increased water storage assets, improved water packaging capabilities, and additional water purification capabilities.

The Army requires additional 3,000 gallons per hour reverse osmosis water purification units to handle requirements beyond the Contingency Force.
(see Figure M-12)

The 600 gallons per hour (GPH) Reverse Osmosis Water Purification Unit (ROWPU) is employed at the division and brigade levels. Current models of the 600 GPH ROWPU are approaching the end of their life expectancy and do not have fresh water by-pass capability. They are scheduled to be replaced with the Enhanced ROWPU on a one for two basis, reducing equipment and operator requirements and still maintaining adequate water purification capabilities for the division and brigade units.

A Lightweight Water Purifier is required to provide Special Operations Forces, Rangers, and disaster relief task forces the capability to purify water during rapid tactical movement and independent operations. A research and development effort is in process to meet the need. Candidate systems are currently being evaluated. A Milestone I/II is planned for March 95 with initial operation test and evaluation occurring in late FY 96.

A Packaged Water System is also in development. The system packages water in expendable, biodegradable containers that may range in sizes up to five gallons. The system resupplies water to isolated task forces communication and to combat units during establishment of theater support. The system reduces the transportation assets required to line haul water, and enhances water resupply in nuclear, biological, or

chemical environments. A Milestone I/II is planned for June 95 with initial operation test and evaluation to be conducted in early FY 97

Future water supply efforts are required; for example, to investigate hand held, individual water purifiers that can purify any water (including sea water) and be carried in the soldier's battle dress uniform or rucksack, and to improve analytical capabilities (e.g., to measure the presence of nuclear biological chemical agents and other contaminants in both raw and drinking water).

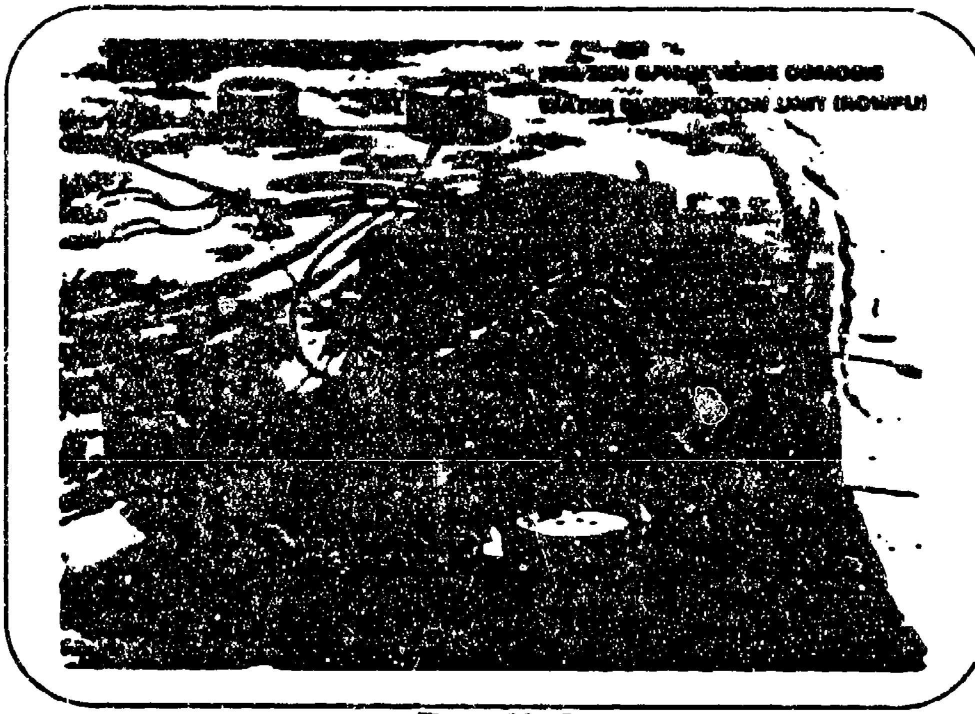


Figure M-13

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

The assessment for this program for near-, mid-, and far-terms is **AMBER**. Water production and distribution equipment does not to meet the total support and sustainment requirement. Procurement of the 3,000 gallons per hour Reverse Osmosis Water Purification Unit is sufficient only for the Contingency Force and training base. Research and development of a 1,500 gallons per hour Reverse Osmosis Water Purification Unit is required to meet brigade/division production requirements but is not affordable at present.

The overall assessment of the 11 programs in the **SUSTAIN** category is **AMBER**.

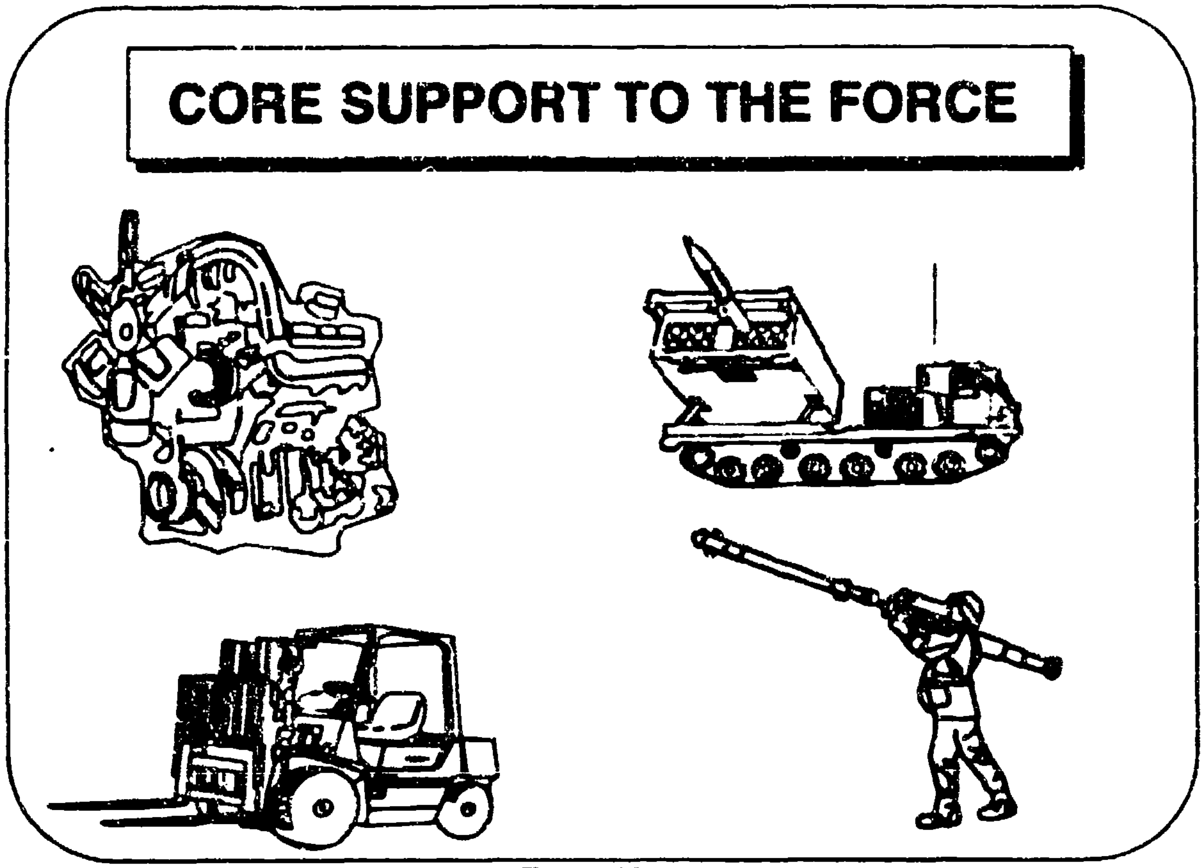


Figure M-14

CORE SUPPORT PROGRAMS

Ammunition. The ammunition program consists of: (1) training and war reserve ammunition for the Army; and (2) industrial facility support of conventional ammunition, demilitarization, and stockpile management (OMA funded) for all Services. In response to the FY 95-99 Program Review, the Army conducted a management and functional area assessment of conventional ammunition. The assessment was a detailed, comprehensive review of the entire life cycle process of ammunition including requirements determination, programming and budgeting, procurement, production, stockpile management, usage and demilitarization. Conventional ammunition is one of the Army's greatest modernization deficiencies. Training ammunition is not fully funded from FY 97-01. Industrial base, stockpile management and demilitarization functions are resourced to address critical requirements only. In ammunition modernization, the Army identified 17 modern war reserve items to provide threat overmatch capability. Affordability constraints limit procurement to only eight of these munition items: 120mm tank, 155mm Sense and Destroy Armor, 155mm HE Enhanced Range, Wide Area Munition (WAM), 105mm Dual Purpose Improved Conventional Munitions, 120mm Mortar, 60mm Mortar and the Combat Vehicle Defensive Obscurating System (vehicle smoke screening grenade).

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

Assessment for this area (less training) is **AMBER** for near-, mid-, and far-terms. Training ammunition is rated **GREEN** in the near-term and **AMBER** in the mid- and far-terms.

Explosive Ordnance Disposal. This program procures and develops specialized tools and test equipment required by soldiers to perform dangerous "render safe" operations on unexploded ordnance. Proper equipment enhances mobility, productivity, and safety of operations.

Presently, fiberscopes and x-ray sets are [illegible] replace antiquated tools and test items. But even such equipment is fast bec[illegible]ed. Improvements are required in the area of remote and robotic ordnan[illegible]tion. The Navy is conducting research and development of these systems as the DoD executive agent. Modernization items include the remote controlled reconnaissance monitor, the remote ordnance neutralization system, and the mobile ordna[illegible] disrupter system. These systems would replace the antiquated items currently in the field. However, due to funding constraints, the Army is not programmed to procure such items as they complete development.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is **AMBER** for near-, mid-, and far-terms. No procurement funds are programmed to acquire improved explosive ordnance disposal equipment which is required for rapid and safe clearing of unexploded ordnance on the battlefield.

Integrated Family of Test Equipment. This program develops modular, reconfigurable automatic test equipment to satisfy test requirements across equipment commodities and to meet the operational readiness needs of sophisticated systems and state of the art technologies. It consists of commercial-based automatic test equipment ruggedized for field use.

The Integrated Family of Test Equipment standardization reduces support structure costs while replacing numerous currently fielded weapon system-specific automatic test equipment. A broad range of unique, weapon-specific test equipment is currently in the field: the direct support electrical system test set for Abrams tank and Bradley fighting vehicles; the land combat support system for TOW, DRAGON, and Shillelagh; test support system and electronic equipment test facility for aviation; and the electronic quality assurance test equipment for other weapons, communications, and electronics equipment. Generic test equipment reduces structure requirements and enhances readiness.

Such equipment isolates/repairs weapon system faults to the electronic line replaceable unit at direct support units. This is accomplished through state of the art general purpose, automatic testing and diagnostic equipment for electronic intensive weapon systems maintenance. It consists of the test set electronic system for front-line and flightline on-system testing; the base shop test facility for off-system testing; the commercial equivalent equipment for depot and fixed facility locations; and, test program set development for weapon system unique application on the DoD standard automatic test system.

The Integrated Family of Test Equipment eliminates the spread of system unique automatic test equipment and reduces use of obsolete automatic test equipment. Its standardization of use and deployability enhance the Army digital modernization support capability.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is **AMBER** for near-, mid-, and far-terms because only 75% of total requirements are met. The shortfall must be overcome by a combination of system specific or antiquated test equipment, all of which increases operational costs.

Maintenance Equipment. Maintenance equipment modernization consists of limited ordnance support equipment required to modernize units and enhance the capabilities to support readiness of weapon systems. This consists of hydraulic repair trailers, shop equipment contact maintenance trucks, welding shops, and major shop equipment.

The hydraulic repair trailer consists of a watertight, aluminum, compartmentalized enclosure mounted on a trailer and powered by a field power generator. Accompanying hydraulic tools enable repair and testing of numerous types of hose using common equipment.

The shop equipment contact maintenance truck is a High Mobility MultiPurpose Wheeled Vehicle (HMMWV) chassis with shelter and tools. Three variations projected to be fielded are the Aviation, Engineer/Ordnance, and Explosive Ordnance Disposal models. All shelters can be transferred from one truck chassis to another without modification. The chassis replace current overaged vehicles that lack the mobility required by unit maintainers and forward direct support teams.

The weld shop is a 2-1/2 ton trailer mounted, self contained unit with provisions for accomplishing oxyacetylene, electric arc, metal inert gas, tungsten inert gas, and carbon arc welding for ferrous and nonferrous metals. This system provides field fix capabilities using modern welding technologies.

Major shop equipment items include service kits, torch outfits, brake machines, lathes, and injection tool sets. Many items of presently fielded equipment are antiquated and require replacement. This program provides minimal relief.

The heavy repair vehicle replaces current tracked maintenance vehicles. The current family of repair vehicles provides only limited onboard storage for repair modules and diagnostic tools. The wheeled repair vehicle improves mobility and support provided by unit mechanics and direct support repairers in armor and mechanized battalions and their direct support maintenance support units.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

The Maintenance Equipment program is **AMBER** for near-, mid-, and far-terms due to reduced procurements. The Contingency Force receives only 33% of the contact maintenance trucks, and 10% of the improved recovery vehi[illegible] No heavy repair vehicles are funded.

Materiel Handling Equipment. Army materiel handling equipment is insufficient in both type and quality to meet current lifting, unstuffing, and handling requirements. Materiel handling equipment modernization consists of three systems: All-Terrain Lifter, Articulated System; 50,000 pound Rough Terrain Container Handler; and, Container Cargo Retriever.

The All-Terrain Lifter, Articulated System is a 10,000 pound forklift which replaces the current overaged 10,000 pound forklift on a one for one basis. This system's extendible boom provides a new container pallet stuffing and unstuffing capability.

The 50,000 pound Container Cargo Handler is used in transportation units to transfer, lift, move, and stack 20 and 40-foot long containers. This equipment improves operations in both Logistics-over-the-Shore (LOTS) and port operations. FY 96 funds a limited rebuy, but only provides the force projection requirement.

Container Cargo Retriever is required in units that process supplies from 40-foot containers. This retrofits their 6,000 pound variable reach or All-Terrain Lifter, Articulated System forklifts. This equipment decreases unloading time, improves safety, and significantly reduces soldier labor. Currently, there is an unresourced research, development, and procurement requirement.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

The program is **AMBER** for the near-, mid-, and far-terms due to shortages and over-aged condition of current equipment; shortages significantly hamper mission

readiness. FY 96 resourcing is sufficient to procure All-Terrain Lifter, Articulated System for Contingency Corps requirements only. Funding to procure 50,000 pound Rough-Terrain Container. Handlers is sufficient only to support 57% of Force Package 1.

Tactical Electrical Power. The new Tactical Quiet Generators support new system fieldings and replace antiquated military standard systems (most of which average 18 years of age). The new generators standardize fuel, provide audible and signal suppression, improved high altitude electromagnetic pulse protection to electrical power systems (for command post, intelligence systems, operations, and logistics functions) reduce operations and maintenance costs.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	RED	RED

The Tactical Electrical Power program for near-term is **AMBER**. Only the Contingency Force receives this equipment. Resources are unavailable to support forward deployed and follow-on forces, and peacekeeping and humanitarian missions. The mid- and far-terms are **RED** because of antiquation and wear-outs of power generation currently fielded.

TACTICAL QUIET GENERATOR

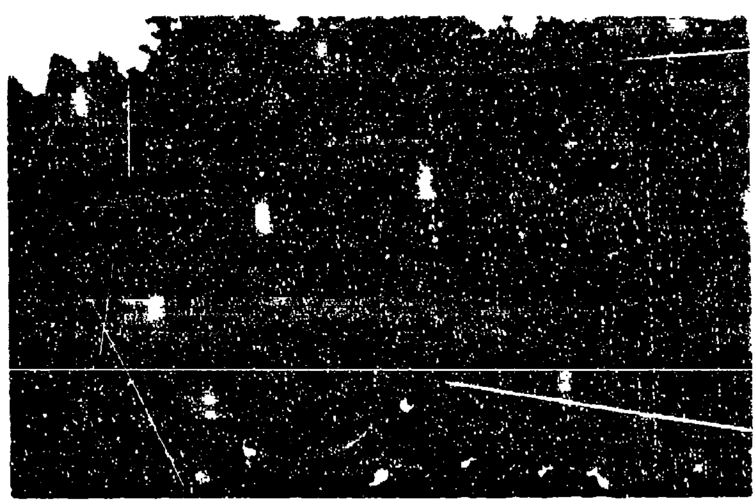


Figure M-15

Test Equipment Modernization. Modernized test, measurement, and diagnostic equipment replaces obsolete equipment and upgrades maintenance capabilities including the calibration repair maintenance function. This program procures state of the art, cost effective, nondevelopmental item hardware required for horizontal technology integration, digitization, and new weapon systems.

Approximately 2,500 makes and models of general purpose test equipment items have been replaced thus far with sixty nondevelopmental items since initiation of this program in 1981. The current program includes ammeters, frequency counters, multi-meters, oscilloscopes, pitostatic test sets, radio test sets, signal generators, spectrum analyzers, and voltmeters.

This program eliminates many of the stringent requirements found in military specifications, and maximizes the use of commercial industry standards. It supports a procurement program based on specific hardware mission requirements rather than manufacturing specifications. However, the current program does not keep pace with high technology integration initiatives and permits only minimum test and calibration equipment fielding.

NEAR-TERM	MID-TERM	FAR-TERM
AMBER	AMBER	AMBER

This program is **AMBER** for the near-, mid-, and far-terms because only 25% of total force requirements are met. Current antiquated automated test equipment in the field continues to impede effective maintenance programs.

The overall assessment of the seven programs in the CORE support category is **AMBER**.

SECTION 4

RESEARCH, DEVELOPMENT AND ACQUISITION STRATEGY

"Without supplies, neither a general nor a soldier is good for anything."
Clearchus
Speech to the Ten Thousand
401 BC

The equipment needed by logisticians to accomplish their mission tasks will be acquired, wherever possible, by procurements of commercial nondevelopmental items, or from sister Services, or from foreign sources. Logistic systems are shown in Figure M-16.

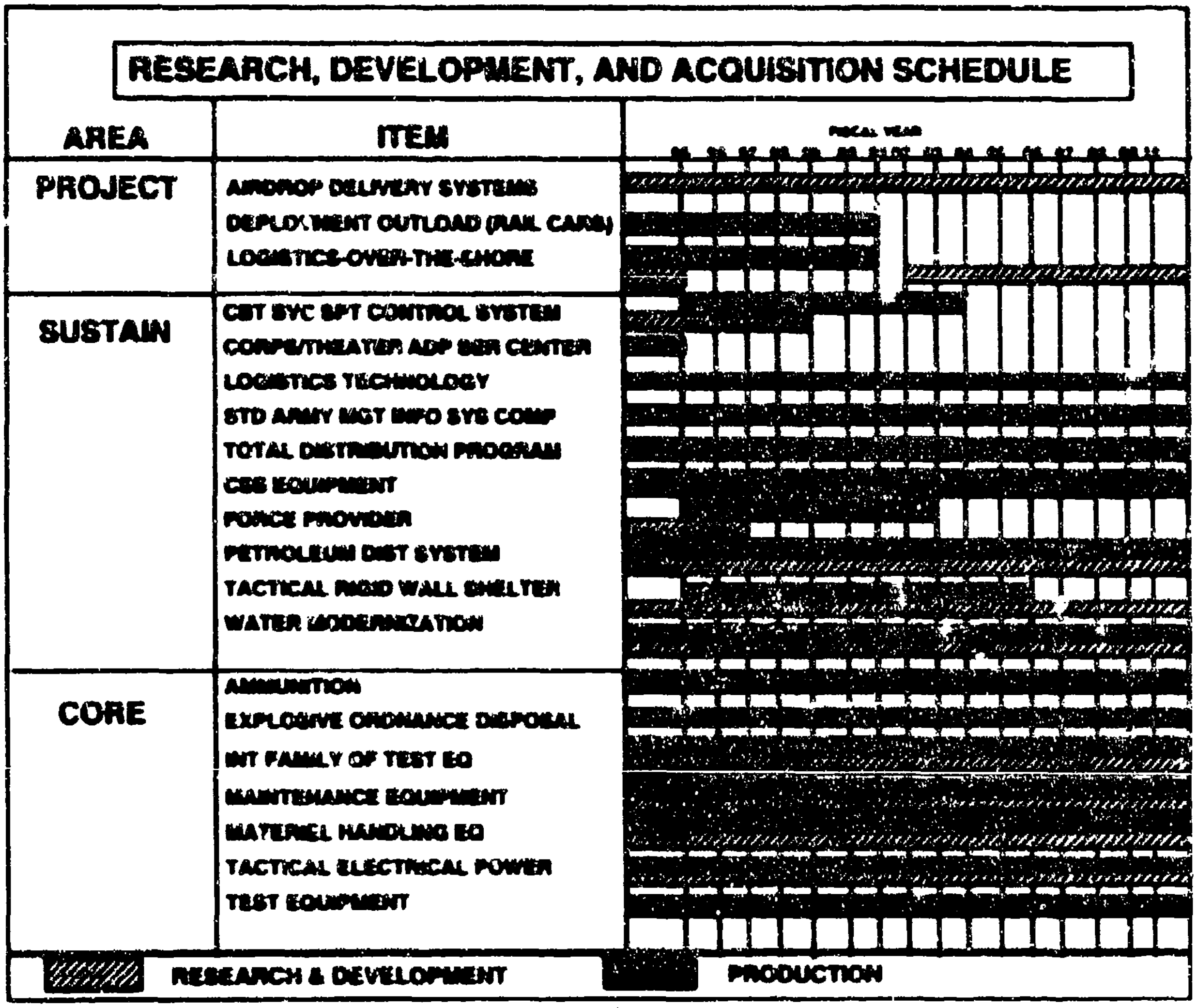


Figure M-16

Airdrop Delivery Systems. Current research and development funds provide a wedge only. The advanced parachute and harness system will be fielded in FY 96-97. C-17 testing inclusive of low velocity airdrop systems terminates in FY 95. The new family of advanced precision guided delivery systems remains in the technological base with possibility of the program being conducted under advanced development in the next program cycle.

Deployment Outload Rail Cars. The Army is procuring rail cars to meet the requirement to deploy its initial ready brigades in the first seven days of mobilization. The Army is studying the possibility of procuring used rail cars vice new rail cars to fill this requirement. Initial information indicates that used car procurement could meet the requirement two years earlier (FY 99 vs. FY 01) if current funding is maintained. Used rail cars may not be available in the types needed, however. Rail cars have a life of forty years; thus, the potential for time and cost savings exists without impacting readiness.

Logistics-over-the-Shore. The Army has sufficient 100 foot tug boats, landing craft utilities, landing crafts mechanized, and logistic support vessels to support one major regional conflict. U.S. Army Reserve is using dedicated procurement program funding to procure one 100 ton crane and two pusher tugs to meet requirements of another Major Regional Conflict. Logistics-over-the-Shore continues to have an unfunded requirement for 19 coastal harbor and inland waterway boats and two floating cranes. Excepting the procurement of two 100 ton cranes, the combination of on-hand equipment, prior year funding, projected funding, and U.S. Army Reserve directed procurement program, the Army will meet Logistics-over-the-Shore requirements.

Combat Service Support Control System. Current research and development funds allow completion of Version 5 objective software. The decision for full rate production will be made at the Milestone III Army Review Council III in March 95. The first production will occur toward the end of FY 95. Fielding of the Contingency Corps will occur by FY 01.

The Corps Theater ADP Service Center - Phase II. The Corps\Theater ADP Service Center - Phase Two (CTASC-II) program production is an assemblage of commercial items, and Army and DoD equipment.

Logistical Technological Systems. The logistics marking and symbology systems are procured as nondevelopmental items. These items can be bought as the latest technology dictates. The current contract with several vendors is open ended; items are bought as they are needed. The microchip technology portion is part of an existing Air Force contract.

Standard Army Management Information Systems Computers. Standard Army management information systems computers are nondevelopmental items. The current contract, with several vendors, is opened ended. Items are bought as they are needed and as the latest technology dictates.

Total Distribution Program. The Total Distribution Program consists of separate integrated critical fixes that correct the shortfalls of the whole program. The research, development and acquisition strategy for each piece is:

Total Asset Visibility software continues to be developed adding additional classes of supply, customer requested enhancements, and broadening item coverage. The software will be fielded to the Total Army by FY 00

Automated Identification Technology uses an existing Air Force contract to provide Army needs.

Mobile gateway vans for satellite tracking use already procured commercial nondevelopmental components.

Split-based operations is covered by Corps Theater Automatic Data Processing Service Center - Phase II funds for FY 94-95, this allows initial operating test and evaluation, and fielding to the Contingency Corps. The follow-on to a successful split-based operations concept is included in this program. This will be fielded to the remainder of the Army.

Computer interfaces are marginally funded in the Standard Army Information Management Systems program and in the Total Distribution Program. Computer interfaces are bought via an open ended contract with several vendors, and items are bought as they are needed. Software enhancements continue to provide information system connectivity to the tactical packet network. Large capacity switches related to tactical communications are being converted by project managers.

Combat Service Support Equipment. The laundry and dry cleaning system is scheduled for technical testing and operational testing in FY 97 and FY 98 respectively, with a type classification date in the 4Q FY 98. Procurement is scheduled for FY 99.

The family of space heaters planned type classification dates are 3rd Qtr 96 for the space heater-medium with procurement scheduled for FY 97, 3rd Qtr FY 97 for the space heater-small, radiant with procurement scheduled for FY 98, 3rd Qtr FY 97 for the space heater-Arctic with procurement scheduled for FY 98, and 3rd Qtr 98 for the space heater-small, self-powered system with procurement scheduled for FY 98.

The Containerized Laundry and Clothing Repair system is scheduled to be type classified in 4th Qtr FY 97. Procurement is scheduled for FY 98.

Minimal funding for soft shelters is maintained for development. Soft shelters are procured by the Defense Logistics Agency. If the soft shelter unit cost exceeds $15K, a funding line is established. It is anticipated a funding line for competitive procurement will be required for the Transportable Helicopter Enclosure after type classification-standard procurement in FY 96.

Force Provider. Force Provider is an assemblage of commercial, Army and DoD equipment.

In 1995, competitive contracts will be awarded to procure equipment sufficient to produce two 550 person modules. Where available, options will be exercised on existing requirements contracts to reduce costs. Where stock is available, equipment will be procured from stock.

The current schedule allows for the delivery of two modules in December 1996. Future deliveries are scheduled as follows: two modules each in 1997, 1998, 1999; and one module each in 2000 and 2001. The modules are to be prepositioned at Sierra Army Depot as operational project stock.

To satisfy contingencies between the present time and December 1996, two interim support systems of six modules each have been assembled. Equipment for these modules was obtained by drawing down excesses, issue from stock, and the purchase of secondary items. The first six modules were prepositioned aboard ship in January of 1994. The second six modules were completed in October 1994 and are positioned at Sierra Army Depot ready for deployment.

In addition to the interim support systems programs, a preplanned product improvement program is being accomplished. Improvements are to be made in the laundry and latrine subsystems. These improved subsystems will be incorporated into the production modules. As part of the production program, a winterization kit is to be assembled to expand Force Provider's deployment capabilities. The winterization kit will be purchased in sufficient quantities to support up to one third of the total Force Provider capability. The kits will remain in operational project stock until required to support Force Provider modules deployed to climates with temperatures below +32 degrees F. The winterization kit is to be assembled by July 1995 and available for production by December 1996.

Petroleum Distribution Equipment. The Advanced Aviation Forward Area Refueling System is scheduled for first article test in 2Q FY 95 with subsequent procurement in FY 96. The Modular Base Petroleum Laboratory is in advanced development; procurement of one system occurs in FY 95 and a second system funded in FY 96. The Petroleum Quality Analysis System is in the Milestone I research and development phase. The Inland Petroleum Distribution System is procured throughout FY 01; reconstitution/containerization of this system is ongoing at Sierra Army Depot.

Tactical Rigid Wall Shelters. Most shelters are customer funded and procured periodically by ATCOM; two shelters have production funding. Chemically and Biologically Protected Shelter - will be type classified, limited procurement urgent in December 1994, and Standardized Integrated Command Post System Rigid Wall Shelter will be type classified standard procurement in FY 96. Both will be procured competitively.

Water Modernization. The Lightweight Water Purifier, Milestone I/II is planned for March 95 with initial operations test and evaluation occurring in late FY 96. Candidate systems are currently being evaluated. The Packaged Water System, Milestone I/II is planned for June 1995 with initial operational test and evaluation conducted in early FY 97.

Ammunition. The government-owned ammunition base has been reduced from 16 active plants in 1991 to 9 today -- with facility divestiture continuing throughout the FY 96-01 program. The ammunition production base manufactures ammunition items requested by all Services; minimally supports plant downsizing and closure plans; and inadequately supports reduction of DoD's backlog of ammunition demilitarization items.

For ammunition logistics, current technology base funding provides these demonstrations: new ammunition packaging technologies; explosive safety improvements; improved rearm systems for artillery, attack helicopters, and air defense weapon systems; teleoperated handling and movement equipment; and source data automation technologies. Some of these technologies transition to item developers for insertion into system development programs, such as the Lightweight 155mm Howitzer, PATRIOT Missile, Apache attack helicopters, and the Total Distribution System (TDS). Others can be inserted into new production, into programs for the selective repack of operational stocks, or directly into logistics system nodes. Technology base reductions in FY 96 will delay implementation of these technologies two to five years.

Explosive Ordnance Disposal. Research and development of key elements of Explosive Ordnance Disposal items is conducted by the U.S. Navy, as DoD executive agent. Key systems required for adequate support and safety of soldiers who conduct Explosive Ordnance Disposal missions include the mobile ordnance disrupter system, the remote controlled reconnaissance monitor, and the remote ordnance neutralization system. No Army research and development nor procurement is programmed.

Integrated Family of Test Equipment. This equipment is one of only two families that fall within the DoD directive requiring acquisition of interoperable electronic maintenance equipment. This requires that all Army electronic maintenance equipment acquisitions conform to the Army's standard family.

The base shop test facility and contact test set are both in full rate production (started in 1992). First Unit Equipped for the base shop was January 1993 and production continues through FY 96. First Unit Equipped for the test set was September 1994; award of a follow-on contract for a smaller, lighter weight version is planned.

Procurement reductions result in lack of support for electro-optical automatic test and calibration equipment and fielding support to key weapon systems. Program funding interrupts base shop test facility fieldings between FY 98 and FY 02. This interruption increases maintenance costs to support workloads from Paladin, Ground

Based Sensor, Improved TOW Acquisition System, Javelin, Nuclear Biological Chemical Fox, and the Unmanned Aerial Vehicle. Electo-optical capability is added to integrated family of test equipment in FY 98.

Maintenance Equipment. The high mobility multipurpose wheeled vehicle contact maintenance truck fielding commences in FY 95. Distribution is two-phased. Initially, the High Mobility Multipurpose Wheeled Vehicle chassis is provided to using units. The shelter and tools are delivered, as produced, as a separate entity. This supports the reconfigurability criteria of the system.

Materiel Handling Equipment. There is a FY 96-97 scheduled nondevelopmental item buy of the all-terrain lifter articulated system with subsequent buys scheduled to FY 03 to support Contingency Force operations. There is an FY 96 procurement effort to buy a limited number of 50,000 pound, rough terrain cargo handlers.

Tactical Electrical Power. Development of the 3KW tactical quiet generator continues. Successful development and procurement of this asset is required to complete the new power generation family. Further research will determine required modifications of generators to meet environmental concerns in outyear fieldings. This is required to ensure exhaust emissions are within federal guidelines.

Test Equipment Modernization. Identification and evaluation of nondevelopmental items continues for manual and semiautomatic general purpose test equipment at troop unit and higher level. Equipment is identified for replacement using performance history and life cycle cost. Nondevelopmental item procedures are used to award best-value contracts based on life cycle cost, and to consolidate test measurement diagnostic equipment makes and models where possible.

New test and calibration capabilities are identified and acquired as weapon systems are developed/modified to reflect state of the art technology. Examples of current fielding include radio test sets, optical power test sets, data communication analyzers and ammeters. High technology weapon systems fielding continues to compel modernization of test and calibration equipment to achieve/maintain requisite readiness.

SECTION 5

TRAINING

"To lead an untrained people to war is to throw them away."
Confucius
Analects, 6 B.C

Combat Service Support forces must train in peace as they will perform in war. This philosophy is certainly not new, but the environments for which we must prepare are increasingly more complex, ranging from major regional conflicts to OOTW. Automated Combat Service Support functions with modular units operating in joint and multi-functional roles require expansion.

The Army must train future logisticians to operate at each level of the logistics continuum. Training must result in mastery of skills and instill the knowledge and confidence needed to anticipate, integrate, and improvise on the future battlefield. Modernization centers on information management; training must focus on acting on that information. Reliance on Combat Service Support Reserve Component units and individuals mandates that our training be applicable to the Total Army.

Logistics training is integral to the Combined Arms Training Strategy. This training strategy incorporates emerging combat developments to ensure training requirements are planned for new systems and organizations. The Combined Arms Training Strategy focuses on the combined arms aspects of warfighting. It calls for training tasks that synchronize combat, combat support, and combat service support.

Unit collective training standards will expand to include tasks critical to all missions. Unit training methods will employ units' automation and communication equipment with realistic but simulated data in scenarios that demand unit versatility, flexibility, and expandability. Leader training will incorporate command/management of modular units in the full range of operations.

Training devices provide realistic instruction with minimal equipment procurement and operating support cost. Devices for maintenance, driver simulation, and watercraft operation are currently in use or in development.

Combined Arms Support Commands' in-house version of the Combat Service Support Training Simulation System was recently linked to operational combat training simulations, Corps Battle Simulation and used to drive a Battle Command Training Program exercise, Prairie Warrior 94, of General Headquarters Exercise 94. The Combat Service Support Training Simulation System provides high fidelity logistics training for units at tactical and operational levels from theater to division. When linked to a corps battle simulation to drive a training exercise, it allows logisticians to train in peacetime as they operate in war. Combat commanders train in a logistically

constrained environment. Reserve logistics personnel train along with Active Army combat commanders and personnel in large scale theater commanders' exercises, as well as in the Army's battle command training program. Smaller combat service support exercises use the combat service support training simulation system to train combat service support units and to prepare the units for exercises with maneuver units. The Army can integrate high fidelity logistics training with combat training when incorporated into joint or multinational training.

Efforts to reduce training time are being made by embedded training and tutorials in the newer automated systems, such as the Combat Service Support Control System and the standard Army management information systems computers.

This training section covers areas specific to Annex M. For further information about Army-wide training initiatives and issues, and detailed explanations of fielding and funding status, consult Annex R, Training.

SECTION 6

CONCLUSION

"I don't know what the hell this 'logistics' is that General Marshall is always talking about, but I want some of it."
Attributed to Admiral Ernest J. King
World War II

Our priorities for the future are:

- Modernize logistics information systems;
- Upgrade Logistics-over-the-Shore;
- Modernize material handling equipment;
- Upgrade Continental U.S. rail;
- Improve soldier quality of life;
- Modernize tactical generators;
- Standardize and modernize test equipment;
- Upgrade petroleum capabilities; and,
- Modernize water supply equipment.

The chart below addresses funding shortfalls and impacts.

SYSTEM	DOES	DOES NOT
AIRDROP DELIVERY SYSTEMS	WEDGE OF FUNDS FOR RESEARCH AND DEVELOPMENT	SUFFICIENT RESOURCES [illegible] ADVANCED RESERVE PARACHUTE AND HARNESS SYSTEM
DEPLOYMENT OUTLOAD (RAIL CARS)	100% FOR CONTINGENCY FORCE	REMAINDER OF ARMY
LOGISTICS-OVER-THE-SHORE	CAUSEWAYS, LARC 60 SLEP, AND PUSHER TUGS FOR TWO MRC	NEW FLOATING CRANES FOR 2ND MRC OR [illegible] BOATS
COMBAT SERVICE SUPPORT CONTROL SYSTEM	100% FOR CONTINGENCY FORCE	REMAINDER OF ARMY
STANDARD ARMY UNIT INFO SYSTEM COMPUTER	TOTAL ARMY	7 YEAR INSTEAD OF 5 YEAR REPLACEMENT CYCLE
TOTAL DISTRIBUTION PROGRAM	100% FOR FORCE PACKAGE 1 & 2	FORCE PACKAGES 3& 4
COMBAT SERVICE SUPPORT [illegible]	CONTAINERIZED KITCHEN FOR CONTINGENCY FORCE	CONTAINERIZED KITCHEN FOR REMAINDER OF ARMY
FORCE PROVIDER	[illegible]% REQUIREMENT FOR TOTAL ARMY	31% REQUIREMENT FOR TOTAL ARMY
PETROLEUM DISTRIBUTION	[illegible]% FOR CONTINGENCY FORCE	SUFFICIENT IN-LAND PETROLEUM DISTRIBUTION SYSTEM
TACTICAL RIGID WALL SHELTERS	[illegible]% OF CHEM-BIO PROT SHELTER FOR CONT FORCE	[illegible]% OF CONTINGENCY FORCE—100% REMAINDER OF ARMY
WATER MODERNIZATION	100% FOR CONTINGENCY FORCE	REMAINDER OF ARMY
AMMUNITION	[illegible]% FOR TRAINING AMMO, [illegible]% FOR PRODUCTION BASE SUPPORT, LIMITED PROCUREMENT OF MODERN AMMUNITION	[illegible]% FOR TRAINING AMMO, 11% FOR PRODUCTION BASE SUPPORT, SUFFICIENT PROCUREMENT OF MODERN AMMO
EXPLOSIVE ORDNANCE DISPOSAL	[illegible]% OF TOTAL REQUIREMENT	[illegible]% OF TOTAL REQUIREMENT
INTEGRATED FAMILY OF TEST EQ	70% OF TOTAL REQUIREMENT	30% OF TOTAL REQUIREMENT
MAINTENANCE EQUIPMENT	[illegible]% OF TOTAL REQUIREMENT	70% OF TOTAL REQUIREMENT
MATERIEL HANDLING EQUIP	[illegible]% FOR CONTINGENCY FORCE	[illegible]% OF CONTINGENCY FORCE & 100% REMAINDER OF ARMY
TACTICAL QUIET GENERATOR	100% FOR CONTINGENCY FORCE	REMAINDER OF ARMY
TEST EQUIPMENT	[illegible]% OF TOTAL REQUIREMENT	70% OF TOTAL REQUIREMENT

Figure M-17

ANNEX N

SOLDIER

SOLDIER SYSTEM MODERNIZATION

ANNEX N

SOLDIER

SECTION 1

INTRODUCTION

The Soldier System is an integrated system of systems that includes the individual soldier and everything worn, consumed, or carried for individual use in a tactical environment.

Modernizing all soldiers is a continuous but evolutionary process that is intended to integrate, package, and provide synergistic improvements to the individual soldier's lethality, command and control, survivability, sustainment, and mobility capabilities on the digitized battlefield. This system also recognizes the need to fulfill varied and tailored requirements of each "type" of soldier.

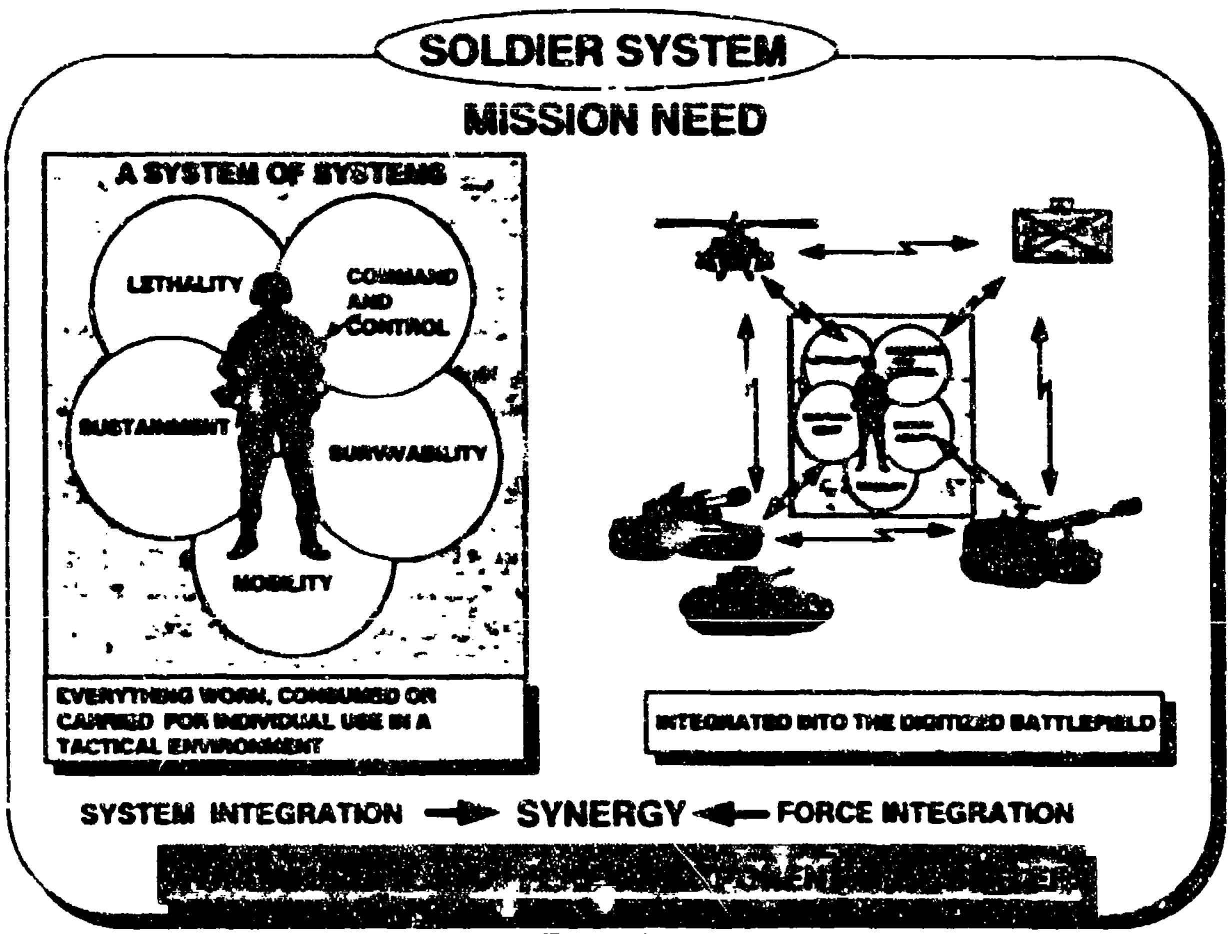


Figure N-1

SECTION 2

WARFIGHTING CONCEPT

The Soldier System modernization strategy employs state of the art technology in digitization, small arms, protective clothing, and equipment so as to improve the combat effectiveness and survivability of the individual soldier. Although the Army soldier will fight more and more as part of a joint force and/or in combined operations, there are no major changes to how we fight as the Soldier System. The Integrated Threat Assessment, Volume I, for dismounted soldiers was completed in August 93, and Volume II, the revised System Threat Assessment (STA), was completed in August 94; together, these provide the Warfighting Concept baseline for the Soldier System.

Today's soldiers and 21st Century soldiers must prepare for and execute missions in a variety of multi-dimensional operations. The Soldier System postulates and defines five significant capabilities needed by every soldier. The goal of soldier modernization is to provide and/or enhance the following capabilities:

- *Lethality* - Increases the soldier's capability to detect, acquire, identify, locate, engage, and defeat threat soldiers and their equipment at greater ranges and in all visibility conditions.

- *Command and Control* - Increases the soldier's capability to direct, coordinate, and control personnel, weapons, equipment, information, and procedures necessary to Win the Information War.

- *Survivability* - Increases the soldier's capability for self-protection against threat weapon effects and environmental conditions through improved situational awareness, reduced signatures, and improved protection.

- *Sustainment* - Increases the soldier's capability to sustain himself in a tactical environment. Sustaining a soldier means supplying him those items fundamental to survival and critical to his overall effectiveness and performance.

- *Mobility* - Increases the soldier's capability to deploy to and move about battlefields. Mobility also allows the soldier to fulfill assigned missions by providing him with improved situational awareness, navigation/location support, improved night vision, better load carrying capability, and reduced/limited weight.

In the past, the individual soldier's clothing, equipment, and rations were considered separate and unrelated in terms of developing requirements and structuring programs. In other words, there has been little system integration with respect to soldier items. The Soldier System was established to overcome this shortcoming. It recognizes that the Army must provide the latest technologies and equipment to

soldiers, and in so doing, improve their battlefield capabilities and survivability. The Soldier System provides individual soldiers: personal protection, communications, and weapons systems that allow soldiers to respond instantly to the chain of command and to rapidly changing situations. Continued enhancements to the Soldier System are key to the success of all missions.

The system approach to soldier modernization has two objectives: optimize and integrate all soldier capabilities at minimal load, and allow the soldier to fully access the digitized battlefield. The Enhanced Land Warrior (ELW) Program was established to develop and acquire integrated systems for the dismounted combat soldier (Land Warrior [LW]), and the combat crew soldier (Mounted Warrior [MW]) and Air Warrior [AW]) as the first step toward modernization goals. These programs will be discussed in Section 3.

The 21st Century Land Warrior Top Level Demonstration (21 CLW TLD) and associated program components was established to provide a substantially enhanced operational capability for the far-term solution. The 21 CLW TLD, with its associated Advanced Technology Demonstration (ATD) and Test Demonstration (TD) (further defined in Section 4), provides substantially enhanced operational capabilities to dismounted soldiers, Marines, and Special Operations Forces (SOF). These constitute the primary means of linking individual soldiers into the digitized command and control network and of using the Army's emerging Technical Architecture for Command, Control, Communications, Computers, and Intelligence (C4I) systems.

The object of the 21 CLW TLD is to demonstrate the enhanced survivability and lethality of the dismounted soldier through: total situational awareness and real time automated targeting; linkage to the digitized command and control network, enhanced multiple threat protection; and leverage of commercial microelectronics and tele-communications. 21 CLW builds on the Soldier Integrated Protective Ensemble (SIPE) Advanced Technology Demonstration (ATD) and integrates the Generation II Soldier ATD as the cornerstone of this approach.

GEN II consists of the Integrated Headgear, Individual Soldier Computer/Radio, Weapons Interface, Protective and Microclimate Cooling Subsystems. The ELW program and 21 CLW TLD are compatible with what a Soldier System requires to support the Force XXI Concept and the Army Chief of Staff initiative to digitize the Army by the year 2000.

SECTION 3

CURRENT PROGRAM ASSESSMENT

Soldier System modernization consists of several programs in each of three Soldier System categories: dismounted combat soldiers (Land Warrior); combat crew soldiers (Mounted/Air Warrior); and all other soldiers. The discussion of the programs in each of the three soldier categories is accompanied by charts which show the time frames and funded/not funded (does/does not) status of each program. A matrix for each category reveals the potential to achieve our modernization objectives; the matrix uses a RED, AMBER, GREEN rating scheme.

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and,

GREEN -- Adequate capability and quantity exists to perform the mission.

Current program assessments are made with near-term (FY 95-96), mid-term (FY 97-00) and far-term (FY 01-09) POM durations.

The path to soldier modernization is multi-faceted. The Soldier Integrated Protective Ensemble Advanced Technology Demonstration (SIPE ATD) which was completed in December 1992 successfully demonstrated the Soldier System's approach to modernizing the soldier. The SIPE ATD (1989-1992) demonstrated and assessed the technological feasibility and operational benefit of component and subsystem integration as well as the potential of new capabilities and/or enhanced operational effectiveness in operational environments. The technologically mature, high payoff capabilities identified in SIPE are being pursued through tailored, modernization strategies for the ELW Program, in order to field equipment as fast as technology allows.

This integrated and modular approach to system acquisition ensures a proper tooth-to-tail ratio when equipping soldiers for combat. The ELW strategy in Figure N-2 is structured for the continuous modernization of all soldiers by using significantly distinct and nontraditional acquisition approaches. Soldier Modernization will be accomplished via integrated acquisition programs embodying procurement approaches ranging from NDI/modified NDI through integrated programs such as LW, MW, and AW. The first approach addresses quick fixes in 36 months or less from concept to Type Classification (TC) through the Soldier Enhancement Program. The second approach addresses Modular Improvements which require limited Research, Development, Test and Evaluation (RDT&E), and can be completed in more than 36 months from concept to TC. The third approach addresses the more technically challenging areas of Integration and Digitization in the LW program. Finally, the 21 CLW TLD addresses

technologies not ready for fielding (in the Tech Base) but which could or will be integrated into the ELW program upon their maturity.

Some of the operational payoffs of the integrated and modular approach to system acquisition over traditional acquisition approaches are: improved survivability; improved engagement performance, including faster responses to changes in mission/situation; and improved mission duration, interoperability of system components and, potential reduction in weight and bulk.

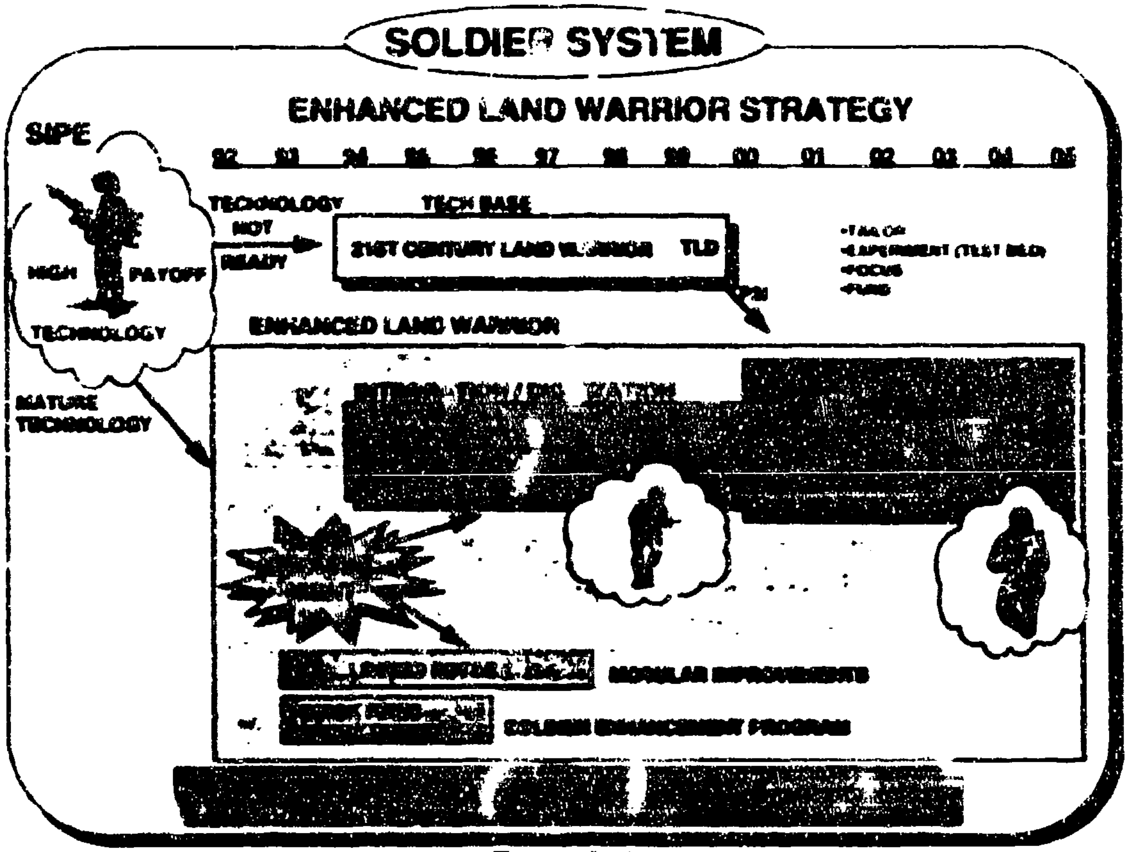


Figure N-2

The Soldier Enhancement Program (SEP) uses nondevelopmental items (NDI) to enhance the combat effectiveness of soldiers and small units. These, in turn, lighten the soldier's load, provide lighter and more lethal weapons, and improve soldier support items. Type Classification of SEP NDI proposals is a quick response mechanism (three years or less from Concept to Type Classification) in order to meet urgent soldier needs with the best of off-the-shelf technologies. When ready or near-ready solutions to Army needs are available, SEP provides expeditious evaluation and adoption or procurement. Many of SEP items are integrated directly into the LW program described later in this section.

Sixteen SEP projects were completed in FY 94 (Figure N-3). Twenty-nine SEP projects are projected to be completed prior to FY 96 (Figure N-4). An additional seven new programs have been approved as FY 95 new starts. To date, a total of 72 SEP programs are either complete or in progress. SEP began as a Congressionally initiated and funded program; however, the Army assumed funding responsibility for SEP RDT&E and production in FY 94.

SOLDIER SYSTEM

SOLDIER ENHANCEMENT PROGRAM
FY 94 RDT&E COMPLETIONS

[illegible] INCENDIARY GRENADE	REDUCED WEIGHT PASGT HELMET
[illegible] BLANK FIRING ADAPTOR	GHILLIE SUIT ACCESSORY KIT
AT4 NIGHT SIGHT BRACKET	PERSONAL HYGIENE BODY WIPES
M24 SNIPER NIGHT SIGHT	MOUNTED WATER RATION HEATER
UNIVERSAL BORESITE DEVICE	SMALL UNIT HEALTH/COMFORT PACK
7.62MM DIM TRACER	MODULAR SLEEPING BAG
MULTI-FAITH MEAL, READY TO EAT	LIGHT WEIGHT UNDERWEAR
INSULATED FOOD CONTAINER	IMPROVED BODY ARMOR STUDY

Figure N-3

SOLDIER SYSTEM

SOLDIER ENHANCEMENT PROGRAM
FY 95 PROJECTED RDT&E COMPLETIONS

[illegible] FLASH SUPPRESSOR/BLAST ATTEN	CLOSE COMBAT OPTICS
[illegible] STRAIGHT TELESCOPE	5.56 MM AP ROUND
MINIATURE BINOCULARS	7.62MM AP ROUND
[illegible] PORTABLE PERISCOPE	.50 CAL MULTI-PURPOSE ROUND
[illegible] COLLAPSIBLE BUTTSTOCK	MEDIUM MACHINE GUN
STUN GRENADE	ELECTRONIC TOOL SUPPLY CATALOGS
DUAL MOUNT MARK 19	INTERIM WATER, IND PURIFICATION SYS
30 ROUND MULTI MAGAZINE HOLDER	LIGHTWEIGHT LEADER COMPUTER
IMPROVED [illegible]	IMPROVED MECHANICS COVERALLS
INDIVIDUAL SOLDIER ENHANCED RATIONS	IMPROVED HOT WEATHER BOOT
IMPROVED PASGT HELMET SUSPENSION	IMPROVED SOCK SYSTEM
IMPROVED RAINSUIT	ENHANCED TACTICAL LB VEST
IMPROVED SHELTER HALF	SMALL UNIT SHOWER
IMPROVED BUTT PACK	PARACHUTIST IMPACT PROTECTION

Figure N-4

Modular improvements to items such as small arms, body armor, load bearing equipment, and chemical protective systems require more RDT&E than SEP (e.g., more than 36 months from Concept to Type Classification). The near-term goal of modular improvements is to offer improved survivability, increased lethality, increased mobility (through reduced weight), improved command and control, improved sustainment, and enhanced versatility. Joint RDT&E and production efforts replace traditional single-service efforts to enhance interservice standardization and economy of scale as it pertains to total life cycle cost. For example, the Joint Service Lightweight Integrated Suit Technology (JSLIST) continues to be the single program to develop standard chemical protective clothing for all four Services. The USMC is the lead for JSLIST I (FUE FY 97), and the Army is lead for JSLIST II for technology insertion. Another example: the Army and USMC are co-proponents for two new programs for modular body armor and load bearing systems. As with SEP, modular improvements are integrated directly into Land Warrior.

Enhanced Land Warrior (ELW). ELW is the Army program for modernizing the soldier as a system. The ELW strategy is twofold: get the best available technology into the hands of soldiers as fast as possible, and look at promising technologies in the technology base and transition them as they mature, into tailored development and procurement programs. ELW is the umbrella for the integrated soldier system: Land Warrior, Mounted Warrior and Air Warrior programs. These programs will integrate equipment already under development in SEP and other RDTE programs with new equipment to enhance the battlefield capabilities of all soldiers.

Land Warrior (LW). The LW program, formerly The Enhanced Integrated Soldier System (TEISS), is the follow-on development to the operational capabilities most successfully demonstrated in SIPE. LW is a fully funded program to develop a first generation, integrated fighting system for dismounted combat soldiers. This program will provide improved capabilities in lethality, survivability, mobility, sustainment, and command, control, computers and intelligence (C4I). LW is the lead program and the technology carrier for ELW as a whole (Figure N-5). LW fields items for the dismounted combat soldier requiring significant component and system integration into the digitized battlefield. The major subsystems of the LW system include integrated headgear, weapon system, protective clothing, individual equipment, communications and computer system. LW will incorporate off the shelf and NDI provided through SEP, augmented with items (modular improvements) from other ongoing development programs, to produce the first soldier system. 21 CLWs will feed into the LW Block II acquisition program.

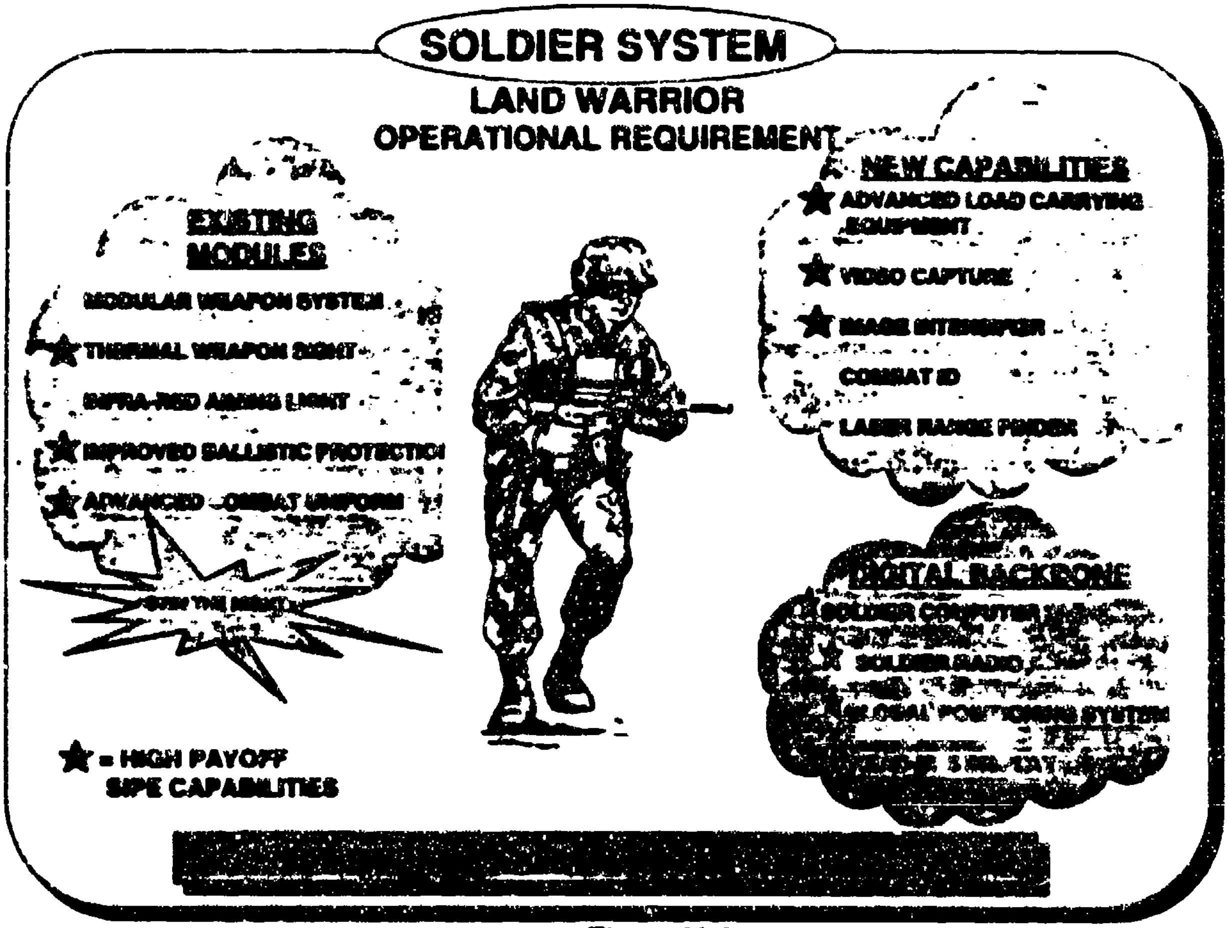


Figure N-5

Many of the technologies incorporated in LW apply to and are horizontally integrated into the Mounted and Air Warrior programs; these are configured optimally to meet the unique operational needs of these two different groupings of soldiers. LW has an approved Operational Requirements Document (ORD). The Milestone I/II decision to approve proceeding to a combined Demonstration/Validation and Engineering and Manufacturing Development (DEM/VAL & EMD) phase was completed August 1994. LW fields the first integrated soldier capability before the end of this decade. The material solutions shown in Figures N-6 and N-7 reflect the funded or unfunded (i.e., does/does not) requirements in RDT&E and/or procurements for the core Land Warrior and associated SEP and Modular Improvement projects.

To describe the funding for any specific program is unrealistic because of the sheer number of Soldier programs. Some programs are funded in RDT&E and not in procurement. Some programs are funded in both RDTE and procurement with sufficient funding lines in some years and insufficient funding lines in others. As with major systems, any non-funded subsystem or component of funded programs could have a greater implication on the Soldier System as a whole.

SOLDIER SYSTEM

DISMOUNTED COMBAT SOLDIER

NEAR FY 95-96

DOES

LETHALITY

M16A2
PAQ-4A IR Aiming Light **
M249 SAW Collapsible Butt Stock *
AT4 Night Sight Bracket *
M4 Carbine
M24 SWS Night Fighting Capability *
HMMWV MG Mount *
M2/M19 Dual Mount
Close Cbt Optic M4/M16
M24 SWS Flash Suppressor/Steel Aft *
Univ Boresight Device
M249 Blank Firing Adapter *

SURVIVABILITY

Laser/Ballistic (SLEPS/SPECS) **
M40 Protective Mask
Imp PASGT Helmet Suspension *
Light Weight PASGT Helmet *
Ghillie Suit Acc Kit *
CAPE *
[illegible] *
Light Weight Rain Suit *
Modular Sleep System *
Neckgaiter *
Hot Weather BDU Cap
Enhanced Hot Weather BDU
3 Pattern Desert BDU
Soldier Ground Insulation
Sock System

SUSTAINMENT

Small Unit Health & Comfort Pack *
Insulated Food Container *
Multi-Fuel Vegetation Ration*
Ind Soldier Enhanced Ration*
MRE 13-16 w/FRHD*
Soldiers' Pocket Knife/Sheath*
RLW-30 Day

MOBILITY

40mm Vest
Enhanced Tac Load-Carrying Vest
Imp Mil Skis/Bi Binding *
Imp Butt Pack *
Hot Weather Boots, Imp *

C2

Lt Wt Video Recon System
Lt Leader Computer*

MID FY 97-00

DOES

LETHALITY

Thermal Wpns Sight AN/PAS-13 **
M16/M4 Modular Weapon System * **

SURVIVABILITY

JLIST ABDO **
M40 Protective Mask P3I
Lt Wt CB Protective Glove *
Lt Wt CB Protective Garment *
Modular Body Armor **

SUSTAINMENT

Individual Combat Records
ECWCS P3I *
Multi Purpose Over Boot
Long Range Patrol Ration Improved
Shelter Half Improvements *
Lt Wt Underwear *
Intermediate Cold/Wet Glove P3I

MOBILITY

Tac Assault Personnel Parachute
Parachutist's Ind Equip Rapid Release
Airpack

C2

Ind. Soldier's Radio

DOES NOT

LETHALITY

40mm IR Illum Round *
40mm Smoke Round *
Enhanced Incendiary Grenade
Machine Gun Optics *
Mod Machine Gun Kit *
XM122 Lt Wt MG Tripod
Selectable Lt Wt Alt Munition*

SURVIVABILITY

Single Soldier Sandbagging Dev *
Multi-threat Body Armor **
Face Paint *

SUSTAINMENT

Tactile Glove

FAR FY 01-09

DOES

LETHALITY

Objective Ind Cbt Wpn
Objective Pers Def Wpn
AN/PAS-XX
Adv Integ Manportable Sys
Heads-Up Display (HUD)
Vision Enhanced Image
Intensification Thermal

C2

Soldier's Computer **
Integrated Helmet **
Global Positioning System **
Soldier Radio **
Digital Compass **
Identify Friend/Foe **

SURVIVABILITY

Protect Fr White/Red Phosphorus
Improved Protection
Multi Threat Warning Device
.9 Chance of No Perforation/Shock
Integrated Flotation System
Enhanced Camo
Adv Ballistic/Laser Eye Protection

DOES NOT

SUSTAINMENT

Reduce Heat Stress
Semipermeable Membrane System for CPU
Waste Elimination System
Vital Sign Monitoring
Improvements to Rations
Packaged Water

MOBILITY

Individual Lift

* Soldier Enhancement Project ** Major Land Warrior Components Blocks I & II

Figure N-6

SOLDIER SYSTEM

DISMOUNTED COMBAT SOLDIER

NEAR FY 95-96	MID FY 97-00	FAR FY 01-09
DCSS NOT (cont)		
LETHALITY		
M9 9mm Pistol		
M24 SWS Imp Spotting Scope*		
Hand Held Lt Wt Periscope*		
Mini Simulators*		
7.62 AP Round*		
5.56 AP Round*		
5.56 Dim Tracer Round*		
.50 Cal Multi Purpose Round*		
Stun Grenade*		
Monocular Night Vision Device*		
Multiple 30 Round Magazine Holder*		
SURVIVABILITY		
Soldier Fighting Cover*		
Fighting Position Revetment Kit*		
Fighting Position Excavator*		
Water Individual Purification System*		
MOBILITY		
Laminated Grapnel Hook*		

*Soldier Enhancement Project

Figure N-7

The Dismounted Combat Soldier assessment in Figure N-8 identifies gaps in programs that must be filled in order to meet stated requirements. Comprehensive requirements documents are needed to fill identified gaps and fulfill developmental programs in the mid- and far-terms.

- Near-term assessment (FY 95-96):

  - *Lethality*. RED, due to immature technology for integrated night vision, and optics for indirect firing, inadequate thermal weapon sights, range of weapons and inability to defeat targets in defilade, heads up display, command and control, and acoustic sensors. The Heads Up Display (HUD) and optics for indirect firing are envisioned to be corrected by Land Warrior. The TWS will start fielding by the end of this term.

  - *Command and Control*. RED, due to immature technology and non-availability of hardware and software to digitally integrate the dismounted soldier into the battlefield vertically and horizontally across Battlefield Operating Systems (BOS). Introduction of the Individual Soldier Radio,

Soldier Computer, Global Positioning System (GPS), and Integrated Helmet and Digital Compass in the far-term will correct near-term deficiencies.

- *Survivability*. **AMBER**, for the overall requirement for Integral Battle Hazard (small arms, direct fire, etc.) and Environmental Protection. Improvements are ongoing in the areas of ballistic/laser visor protection, body armor, and NBC Protective Systems. Flame protection, multi-threat warning, individual soldier micro-climate cooling, and combat identification shortcomings are far-term and beyond objectives. Comprehensive requirements documents are needed to fill identified gaps and fulfill developmental programs in the mid- and far-terms.

- *Sustainment*. **RED**, due to immature technology in the areas of batteries and medical improvements.

- *Mobility*. **AMBER**, due to the weight of the soldier's load.

- *SEP* projects identified in Figure N-6, (*) near-term are **GREEN** for RDT&E but have limited funds (**AMBER**) programmed for production. SEP programs are listed in the near- and mid-terms based on their scheduled First Unit Equipped (FUE) date.

- **Mid-term assessment (FY 97-00):**

  - *Lethality*. **AMBER**, due to inadequate thermal weapons sights and day optics.

  - *Command and Control*. **RED**, due to non-availability of the hardware and software to digitally integrate the dismounted soldier into the battlefield vertically and horizontally across the Battlefield Operating Systems (BOS) (e.g., Brigade and Below Command and Control [B2C2] software and the Soldier Radio/Computer).

  - *Survivability*. **AMBER**, for the overall requirement for Integral Battle Hazard and Environmental Protection. Improvements are ongoing in the areas of ballistic/laser visor protection, body armor, and NBC Protective systems. Flame protection, multi-threat warning, individual soldier micro-climate cooling, and combat identification shortcomings are far-term and beyond objectives. Comprehensive requirements documents are needed to fill identified gaps and fulfill developmental programs in the far-term.

  - *Sustainment*. **AMBER**, due to immature technology in the areas of battery technology and medical monitor.

- *Mobility*. **AMBER**, due to lack of success in ongoing efforts to lighten the soldier's load.

- Far-term assessment (FY 01-09):

  - *Lethality*. **GREEN**. The Land Warrior has improved target acquisition and engagement capabilities (Objective Personal Defense Weapon and HUD), thus increasing the soldier's capability to engage, hit, and kill threat forces at greater ranges with greater accuracy.

  - *Command and Control*. **GREEN**. The introduction of the individual Soldier Radio, Soldier Computer, Global Positioning System (GPS), and Integrated Helmet and Digital Compass in the far-term will correct near-term deficiencies.

  - *Survivability*. **GREEN**. Continuing improvements have occurred in the areas of integral battle hazard, environmental protection, and multi-threat warning (Multithreat Warning Device).

  - *Sustainment*. **AMBER**. Technology is questionable for battery improvements.

  - *Mobility*. **AMBER**. This is due to potential lack of success in the near- and mid-terms to lighten the soldier's load.

DISMOUNTED COMBAT SOLDIER

	Enhanced Capabilities	NEAR-TERM FY [illegible]	MID-TERM FY [illegible]	FAR-TERM FY 01-09
LETHALITY	-Modular Weapon System -Close Combat Optic -Heads Up Display -Integrated (IR) Aiming Light	RED	AMBER	GREEN
COMMAND & CONTROL	-Computer -Intra/Inter Squad Radio -Position Navigation (GPS) -Information Storage	RED	RED	GREEN
SURVIV-ABILITY	-Integral Battle Hazard Protection -Environmental Protection -NBC Protection -Advanced Load Carrying Equip. -Improved Body Armor -Ballistic/Laser Visor -Multi-Threat Warning device -Combat ID Transponder	AMBER	AMBER	GREEN
SUSTAINMENT	-Battery Improvements -Food, Water, Waste Management -Medical Improvements	RED	AMBER	AMBER
MOBILITY	-Better Load Carrying Capability	AMBER	AMBER	AMBER

Figure N-8

Mounted Warrior (formerly Mounted Armor Crewman Ensemble) for the combat ground crew, is an integrated system composed of mounted crewmen and their fighting vehicles. It is composed of modular subsystems that improve the performance of combat ground crewmen in the five cited capability areas (Figure N-9) The operational capabilities and requirements of the Mounted Warrior are linked to the Land Warrior program through technology insertion. Approval of the Mounted Warrior Mission Need Statement (MNS) is expected in FY 95. The materiel solutions shown in Figure N-10 reflect the funded or unfunded requirements for the core Mounted Warrior program, and associated SEP and Modular Improvement projects.

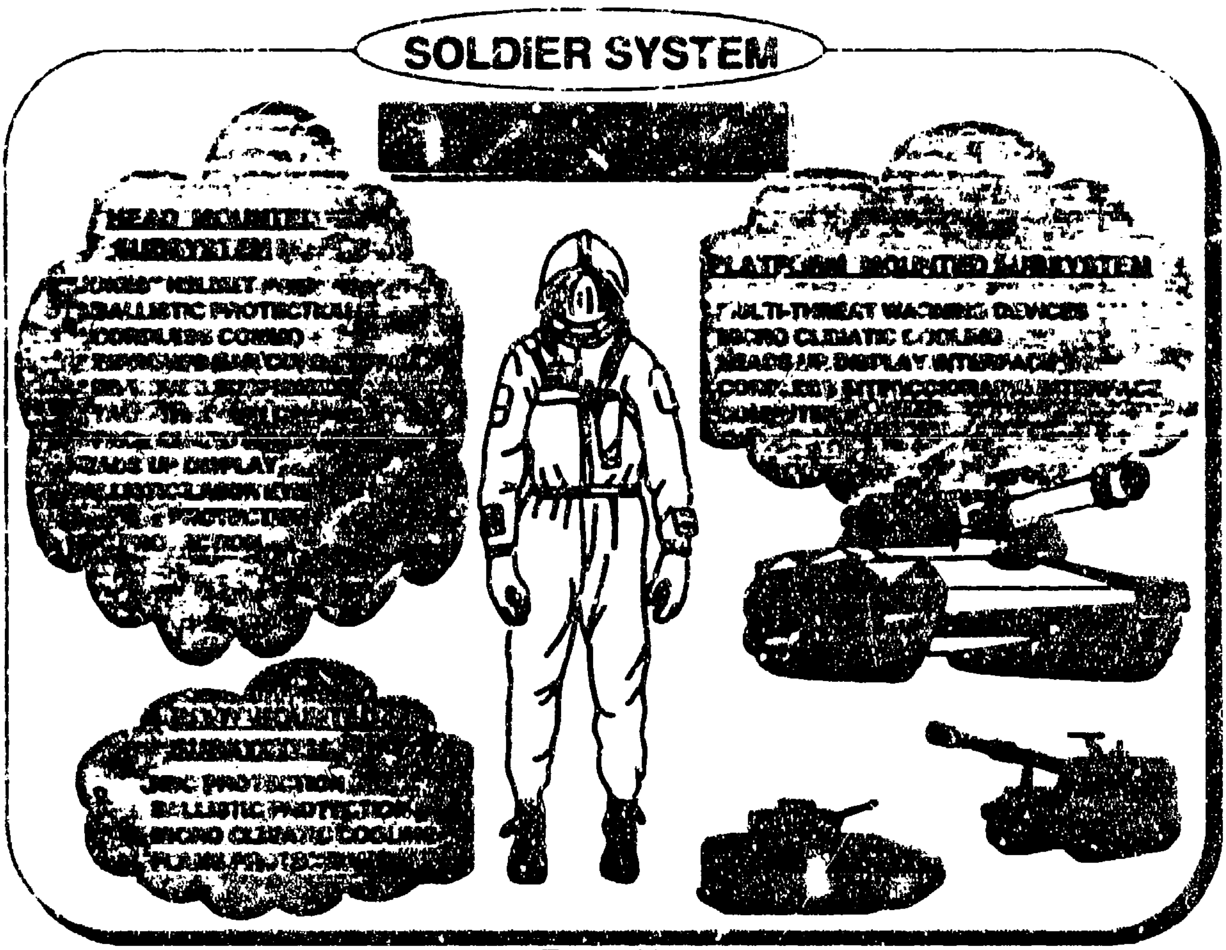


Figure N-9

SOLDIER SYSTEM

DISMOUNTED COMBAT SOLDIER

NEAR FY 95-96	MID FY 97-00	FAR FY 01-09
DOES	DOES	DOES
SURVIVABILITY Suit Contaminate Avoidance Liquid Protection CVC Shell Ballistic Imp* Improved Sun, Wind & Dust Goggles CVC Camo Uniform	SURVIVABILITY Adv CVC Helmet Vapor Protect Flame Resistant Undergarment Armor Crew/Inf Protective Mask*	SURVIVABILITY Integrated/Hybrid Microclimate Ballistic Vest
SUSTAINMENT Soldier Crew Tent* Mounted Ration Heater Dev* Mounted Crew Equip Bag*	SUSTAINMENT Mounted Crew Cold Weather Glove*	
	MOBILITY Combat Crew Boot*	
C2 ACAPS	DOES NOT	
	LETHALITY Stabilized Binoculars*	
	SUSTAINMENT Small Unit Shower*	
	C2 Soldier Radio	

*Soldier Enhancement Project

Figure N-10

The Combat Ground Crew assessment Figure N-11 identifies gaps in programs that must be filled in order to meet the stated requirements. Comprehensive requirements documents are needed to fill identified gaps and fulfill developmental programs in the mid- and far-terms.

- Near-term assessment (FY 95-96):

  - *Lethality*. **AMBER**. Ongoing R&D efforts on the advanced Combat Vehicle Crewman (CVC) Helmet are integrated with the heads-up display of the Mounted Warrior in FY 95-96 to provide a solution in the mid-term.

  - *Command and Control*. **AMBER**. This is due to lack of success in ongoing efforts to advance CVC, HUD, and integrated radio.

  - *Survivability*. **AMBER**. This is due to immature technology of the vapor protective resistance under garment, ballistic vest, and microclimate cooling vest.

- *Sustainment*. **AMBER**. The Mounted Water Ration Heater greatly improves the soldier's quality of life by providing the means to heat rations and water, but have not been type classified in procurement near-term.

- *Mobility*. **AMBER.** This is due to the current inability to maintain the effectiveness of crewmen when dismounted (away from their vehicle).

- Mid-term assessment (FY 97-00):

- *Lethality*. **AMBER.** This is due to inadequate thermal weapons sights and day optics.

- *Command and Control*. **AMBER.** This is due to the nonavailability of the B2C2 software and the Radio/Computer.

- *Survivability*. **AMBER.** This is due to inadequate flame and vapor protection.

- *Sustainment*. **GREEN.** This is due to improvements in rations.

- *Mobility*. **GREEN.** This is due to improved crewman boot.

- Far-term assessment (FY 01-09): The fielding of Mounted Warrior will bring the five capability categories to GREEN.

COMBAT GROUND CREW

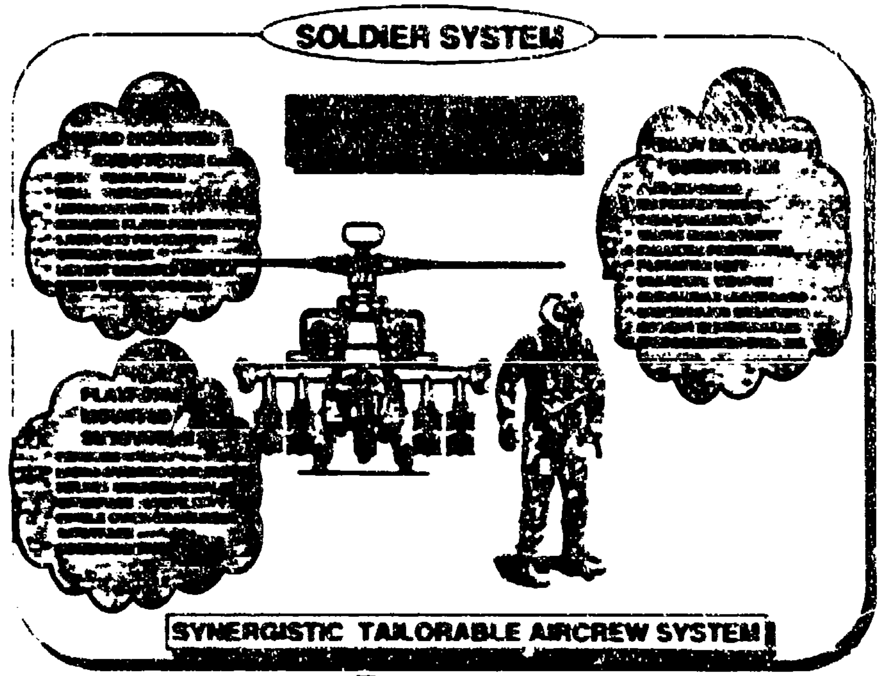
	Enhanced Capabilities	NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
LETHALITY	Similar to Dismounted Soldier	AMBER	AMBER	GREEN
COMMAND & CONTROL	Similar to Dismounted Soldier	AMBER	AMBER	GREEN
SURVIV-ABILITY	Improved Ballistic Protection	AMBER	AMBER	GREEN
	Flame Protection	RED	AMBER	GREEN
	NBC Protection	AMBER	GREEN	GREEN
	Environment Protection	AMBER	AMBER	AMBER
SUSTAIN MENT	Quality of Life	AMBER	GREEN	GREEN
MOBILITY	Combat Crew Boot	AMBER	GREEN	GREEN

Figure N-11

Air Warrior (formerly Aircrew Integrated Ensemble). Air Warrior for the Combat Air Crew is a conceptualized mission tailorable system that standardizes, integrates, and achieves optimum synergy of benefits for several types of current rotary wing Aviation Life Support Equipment (ALSE), and the development of new and improved ALSE (Figure N-12). AW is a joint Army/Navy Acquisition Category (ACAT) III program designed to enhance the aircrew's warfighting capabilities through the development and systems integration of a wide range of individual components and technologies. The AW program will focus on state of the art aircrew mission equipment and protective clothing while operating aircraft. Those portions of the AW system which will interface with air vehicle mounted systems will be integrated through a common interface and design-in compatibility.

Items such as flight clothing, body armor, Nuclear, Biological and Chemical (NBC) equipment, and some helmet functions are improved to protect the wearer against hazards associated with crashes, fires, and threat weapons. The wear of ALSE items, such as flotation gear, antiexposure suits, personal weapons, and radios integrates and compliments each other to improve air crewmen's mission capabilities by relieving the stress of excessive nonintegrated ALSE equipment.

The operational capabilities and requirements of the Air Warrior will be technologically compatible with the Mounted Warrior to the maximum extent possible. Approval of the Air Warrior Mission Need Statement (MNS) is expected in FY 95; this is to be a joint Army/Navy program. The materiel solutions shown in Figure N-13 reflect the funded (does) requirement for the core Air Warrior and associated modular improvement projects.



Figures N-12

SOLDIER SYSTEM

COMBAT AIR CREW

NEAR FY 95-96

DOES

SURVIVABILITY

M43/M43A1 CB Mask
Survival Radio: AN/PRC-90
AN/PRC-112
Survival Raft: SRU-37/P
Survival Armor Recovery Vest w/Inserts & Pockets
1/2 Lines Laser Protective Visors
1/2/3 Lines Laser Protective Visors
Aircrew Uniform Integrated Battlefield (AUIB)
Cold Weather Clothing System
Chemical Protective Undergarment Aircrew BDU
Helicopter Emergency Egress Device (HEED)

C2

SPH-4B
AN/VIS/HUD
AN/PVS-6
Aviator Auxiliary Lights

MID FY 97-00

DOES

SURVIVABILITY

Enhanced AUIB

C2

Common Helmet

DOES NOT

SUSTAINMENT

Aircrew Microclimatic Cooling Vest (ASR)
Microclimatic Conditioning System

FAR FY 01-09

DOES

SURVIVABILITY

Pitz Goggles (Flash)
Built-in Survival Gear
Helicopter Emerg Egress Dev (HEED)

SUSTAINMENT

Improved Aural Protection

Figure N-13

The Combat Air Crew assessment, (in Figure N-14), identifies gaps in programs that must be filled in order to meet the stated requirements. Comprehensive requirements documents are needed to fill identified gaps and fulfill developmental programs in the mid- and far-terms.

- Near-term assessment (FY 95-96):

  - *Lethality*. **GREEN.** This is due to the fielding of the 9mm pistol. The 9mm is purely a self-defense weapon.

  - *Command and Control*. **AMBER.** New radios and auxiliary lighting replace aging equipment in the mid-term.

  - *Survivability*. **AMBER.** Survival uniforms and laser protection visors are in development.

  - *Sustainment*. **RED.** This is due to lack of success in battery technology, food/water/waste management, and medical improvements.

- *Mobility.* **AMBER.** Night vision devices are in development.

- Mid-term assessment (FY 97-00):

  - *Lethality.* **GREEN.** This is due to fielding the 9mm pistol.

  - *Command and Control.* **GREEN.** This is due to fielding of Survival Radio, SPH-4B, AN/PVS-6, ANVIS/HUD, and Auxiliary Lighting.

  - *Survivability.* **AMBER.** This is due to additional R&D needed in directed energy weapons, microclimate cooling, and emergency egress.

  - *Sustainment.* **AMBER.** This will improve with better rations and battery technology.

  - *Mobility.* **AMBER.** This is due to limited availability of night vision devices.

- Far-term assessment (FY 01-09): All areas become **GREEN** with the fielding of Air Warrior.

COMBAT AIR CREW

	Enhanced Capabilities	NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
LETHALITY	Engagement (9mm Pistol)	GREEN	GREEN	GREEN
COMMAND & CONTROL	Improved Flight Helmet	AMBER	AMBER	GREEN
	New Radios	AMBER	GREEN	GREEN
	Auxiliary Lighting	AMBER	GREEN	GREEN
SURVIVABILITY	Ballistic Protection Environmental Protection NBC Protection NBC Uniform Protective Mask	AMBER	AMBER	GREEN
SUSTAINMENT	Microclimatic Cooling Quality of Life	RED	AMBER	GREEN
MOBILITY	Similar to Dismounted Soldier	AMBER	AMBER	GREEN

Figure N-14

All Other Soldiers - The materiel solutions for all other soldiers (Combat, Combat Support and Combat Service Support soldiers) are listed in Figure N-15 and reflect funded or unfunded requirements in RDT&E and/or procurement.

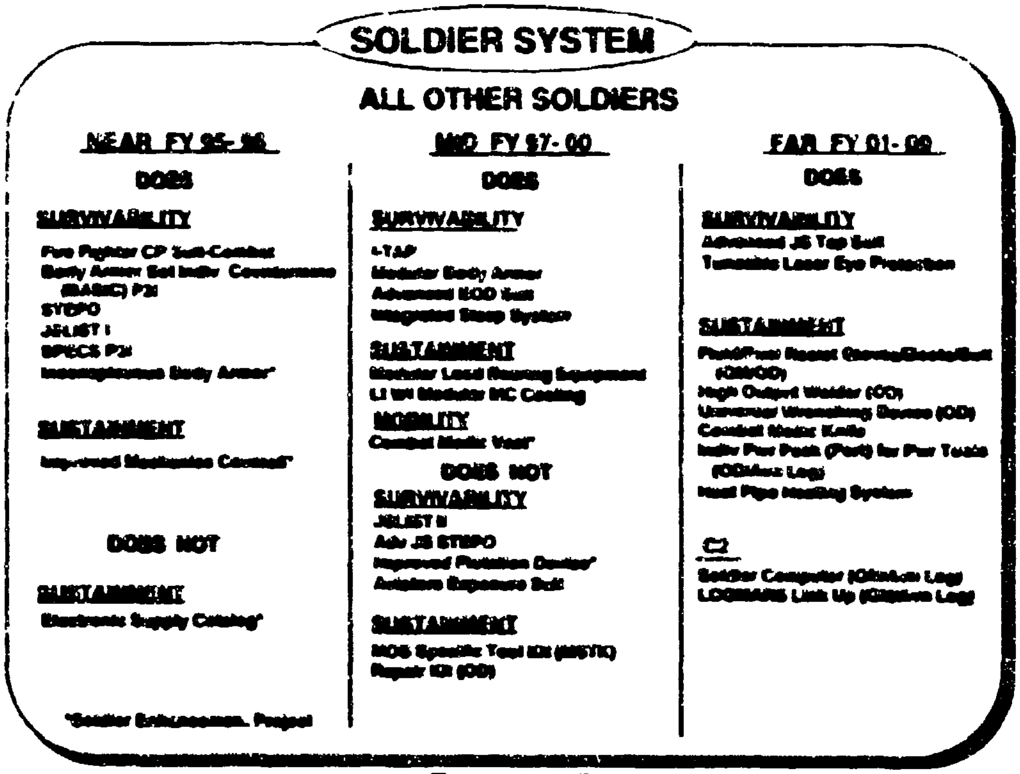


Figure N-15

Central Funding and Fielding (CFF) for the soldier is an integral part of the Soldier System which ensures the survivability, health, operability and safety of the soldiers. The ability to CFF items to the soldier enables the Army to equip Force Packages 1 & 2 (Active Components, (less TDA) Reserve Components (RC) roundup/roundout units, and the entire Contingency Force Pool of Corps/Theater unit) and Special Forces with state of the art life support Clothing and Individual Equipment (CIE) items.

A stable level of funding is critical to the success of Soldier System modernization in order to plan procurements and maximize economy of scale buys. Central Funding and Fielding (CFF) currently funds procurement of Soldier System Clothing and Individual Equipment (CIE) at approximately $60M per year. Production Funding (Operations and Maintenance, Army (OMA) and other procurement appropriations) are currently inadequate to fully fund CFF. Procurement (OMA) funds in the current POM are insufficient to fully modernize the target of 60% of Force Package I & II. CFF funding of SEP production only exacerbates the shortfall. Several years of stable funding are necessary, since without stable funding modernizing soldiers will ultimately suffer.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

The Army continues to implement the systems approach to soldier modernization. This approach uses modular, interoperable components and provides the optimal flexibility, both technologically and operationally, to enhance the operational effectiveness of the soldier and small units. It provides the means to rapidly and easily insert new technologies, and hence advanced capabilities, as they come to fruition. This precludes having to replace entire systems. Operationally, this approach permits mission tailoring and task organization, providing each soldier with those capabilities required to most effectively execute his/her missions.

The Land Warrior Test Bed (Figure N-16) concept helps to accelerate modernization by putting modular subsystems, as they become available, into the hands of actual soldiers, and obtains real data under real conditions. The intent is to supplement formal approaches to testing; e.g., achieve "sanity checks" and the means to rapidly refine definitions of requirements--if we like it, we buy it and field it to soldiers quicker. The Land Warrior Test Bed is being established at the Dismounted Battle Space Battle Lab to make optimal use of existing Modeling and Simulation (M&S) capabilities, along with extensive development of new M&S tools by an Army team. Together, the process enhances the ability to develop, assess, and train with new Soldier Systems and emerging capabilities. Finally, the Land Warrior Test Bed, and lessons learned from it, will become a bench mark for the Mounted and Air Warrior programs.

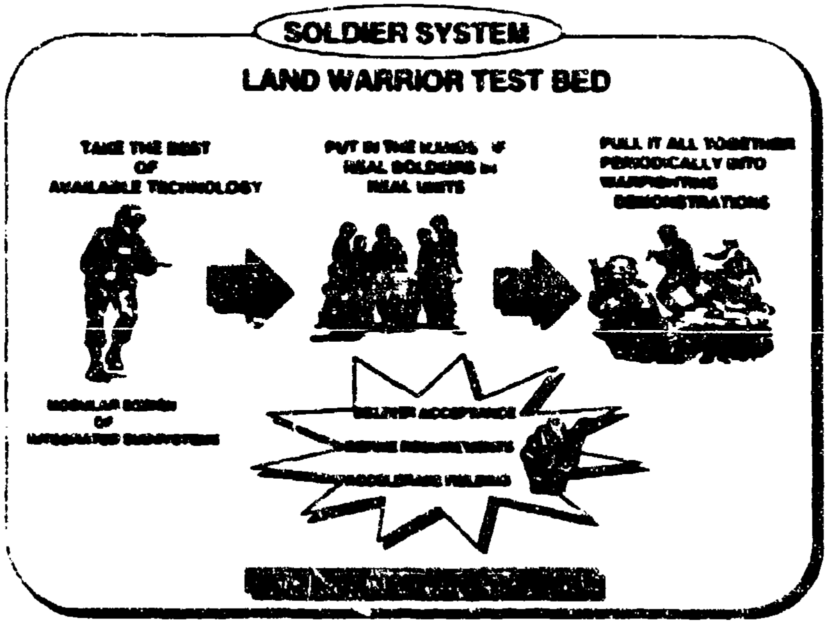


Figure N-16

Parallel to the LW development program, the 21 CLW TLD is the follow-on Science and Technology (S&T) effort to SIPE. 21 CLW, and all its associated program components, provides substantially enhanced operational capabilities for dismounted and SOF soldiers and Marines. 21 CLW is the primary means of linking the individual soldier to the digitized command and control network, and uses the Army's emerging Technical Architecture for C4I systems. 21 CLW culminates in a platoon-level demonstration of field and simulated exercises in FY 98, with several demonstrations and experiments throughout the execution of the program.

21 CLW has GEN II ATD as its cornerstone technical and operational integrating element. GEN II, developed through a single system contract (awarded August 1994), marks the first time the Army used the same approach to develop a Soldier System as it uses to develop major systems and weapons platforms. GEN II consists of the Integrated Headgear, Individual Soldier Computer/Radio, Weapons Interface, Protective and Microclimate Cooling Subsystems. Other elements of 21 CLW, each of which interface and/or integrate with one or more of the GEN II subsystems include: the Objective Individual Combat Weapon (OICW) ATD, the Integrated Sight Modules (ISM) Technology Demonstration (TD), High Resolution Display Systems (HRDS) TD, Advanced Image Intensification (AI2) TD, Forward Observer/Forward Air Controller (FO/FAC) ATD (USMC), Close-in Man Portable Mine Detection ATD, Individual Power Sources TD, Combat Identification ATD and the Multi-Purpose Individual Munitions/Short Range Anti-Armor Weapon (MPIM/SRAW) TD. The integration and aggregation of these elements as a system of modular, interoperable components, provides the following enhanced operational capabilities:

- Automated, accurate target handoff;
- Near real time battlefield intelligence;
- Integrated POS/Nav;
- Digital maps/overlays;
- Route/mission planning;
- Secure, voice-controlled intra/intersquad voice/data radio;
- Automated personnel status monitoring, Combat ID, and CB detection linked to a digital network;
- In-stride mine avoidance;
- Small arms body armor;
- Signature suppression/control;

- Unexposed viewing/firing;
- Enhanced night time maneuverability;
- Information management (reports, op orders, FRAGOs);
- Embedded training/mission rehearsal; and
- Modular, lightweight, mission-tailorable system components for optimal task organization.

The use of a single system contract for 21 CLW/GEN II facilitates optimal system integration and maximum leverage of the commercial sector, particularly in microelectronics and telecommunications. Significant emphasis is being placed on Integrated Product and Process Development (IPPD) to ensure maximum productivity, reliability, and affordability of the system and its components.

SECTION 5

TRAINING

Training requirements for the individual soldier are of two types: training to develop and enhance warfighting skills, and training for new equipment coming into the force. Conventional methods to achieve the former are enhanced by employment of the latest technology in computer based simulators. Training for the latter is accomplished by building on the common skills developed in the use of earlier equipment and by embedded training components/systems into new equipment whenever prudent to do so.

The Dismounted Battle Space Battle Lab, in conjunction with other TRADOC and AMC organizations and the Advanced Research Projects Agency (ARPA), are making strides in the development and linkage of constructive, virtual, and live simulations for use in a Distributed Interactive Simulation (DIS) environment. This capability has the potential to make a significant impact on the Army's ability to not only assess the efficiency and operational impact of the new capabilities afforded by systems such as LW and 21 CLW, but also allow the exploration of new operational concepts (tactics, techniques & procedures), plus a basis of issue to employ these new capabilities to their greatest tactical advantage. This aggregate capability also provides the basis upon which to develop and execute new training programs. It is critical to learn "how to fight" such new operational capabilities before they are fielded, thus enhancing their integration and assimilation into the total force.

In addition, 21 CLW incorporates some embedded training capabilities (e.g., mission rehearsal, troop leading procedures, checklist, embedded technical and field manuals) which may reduce, or at least not increase, training requirements. The objective is to use technology to allow soldiers to perform new tasks or perform existing tasks with greater efficiency and accuracy, rather than to allow technology to divorce soldiers from their environment. It is important to recognize however, that the introduction of "high tech" capabilities does not reduce the critical need to develop basic soldier skills.

This training section covers areas specific to Soldier Modernization. For detailed information on Army-wide training initiatives and issues, and extensive explanations of fielding and funding status, consult Annex R, (Training) to the "1995 Army Modernization Plan."

SECTION 6

CONCLUSION

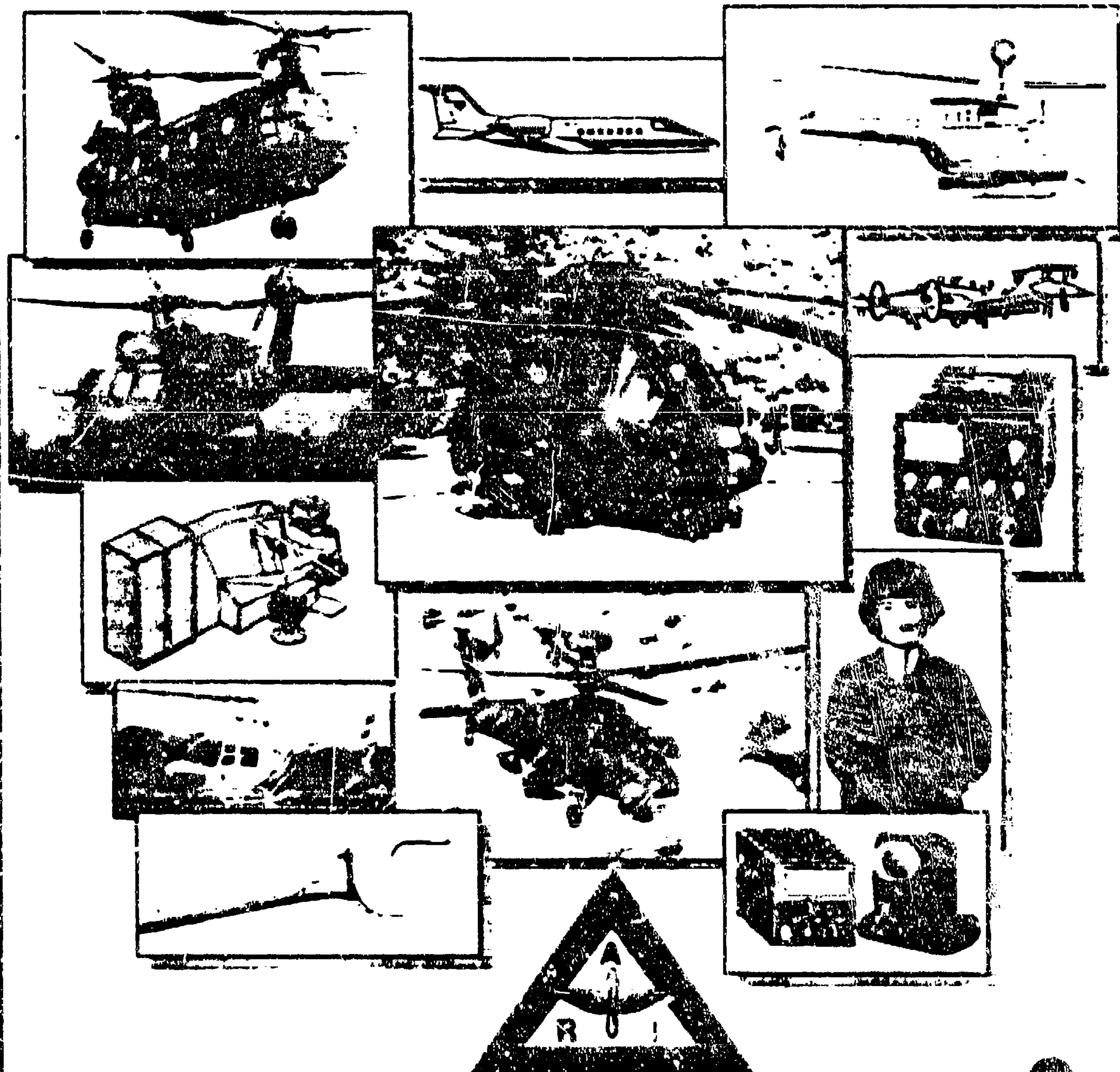
Despite force size and structure changes, and the emergence of new missions for soldiers, the conclusions of the original Soldier Modernization Plan remain valid. Some near-term equipment improvements have been Type Classified while others move toward that milestone. The 21 CLW Top Level Demonstration (TLD) is planned near the end of the decade to showcase the capabilities made possible by technological progress in the years between now and then. This gives commanders the opportunity to evaluate the tactical merit of these capabilities and determine whether they should be included in the Soldier System for the next century.

Fielding modernized soldier equipment under the CFF program slowed during FY 94 as funding was reallocated to urgent needs associated with changing force structures and the world situation. Procurement funds in the current POM are insufficient; current funding does not permit full modernization of the Contingency Force or forward deployed units. It is essential that lost funding be restored to ensure the soldier, as a total system, is prepared to fight, win, and survive in the next battle, and the 21st Century. A return to funding levels consistent with the modernization of the soldier will be pursued in the next POM in order to address this issue.

The soldier remains the cornerstone of the current and the future Force Projection Army. Adequate funding is critical to develop the capabilities demonstrated in SIPE into the fully hardened, militarized, fieldable equipment package, "Land Warrior." This will ensure mission accomplishment, while preserving our nation's most precious resources--her sons and daughters.

ANNEX O

AVIATION



FIELD A TRAINED & READY FORCE

ANNEX O

AVIATION

SECTION 1

INTRODUCTION

U.S. National Military Strategy (NMS) requires ready military forces in peacetime postured to prevent conflict but, should deterrence fail, capable of fighting and winning our nation's wars. This requires flexible, versatile organizations and warfighting systems. It also places increased emphasis on the role of aviation forces. Aviation provides versatile, rapidly deployable, responsive forces that overcome the limitations of ground systems by easily negotiating terrain obstacles, expanding the battle space, massing the effects of fire without massing forces, and delivering precise, lethal fires. Aviation forces operate with equal effectiveness throughout the range of military operations, but particularly in the ever increasing Operations Other Than War (OOTW) category of operations. Aviation forces provide combat, combat support, and combat service support to ground troops.

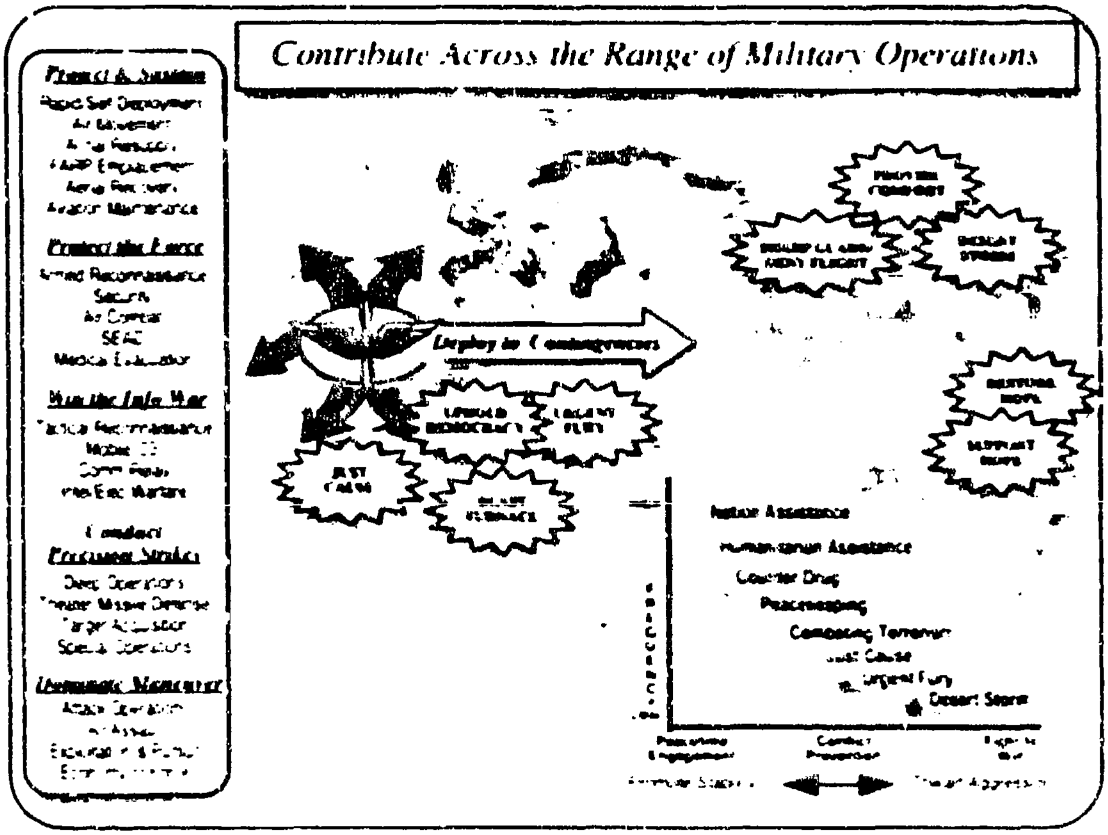


Figure O-1

Army Aviation operations are as diverse as fighting fires in the northwestern United States to relief operations in Rwanda. Aviation forces are now engaged in peace-enforcement in northern Iraq, and are employed in Haiti to secure and assure the stable transition of power. Aviation forces are a visible and powerful forward presence abroad. And those units still in the U.S. are capable of rapid force projection via self-deployment, strategic airlift, and strategic sealift to any theater in the world. To assure such capabilities continue to deliver both deterrent and combat power for Army aviation, our forces must have adequate equipment, force structure, and fiscal resources. Continuing modernization of Army aviation pays significant dividends to U.S. national military strategy. This is the Army's road map for aviation modernization.

The objective of the Army aviation modernization strategy is to reduce the rotary and fixed wing fleets to four aircraft types each. Materiel modernization focus and priorities are driven by four tenets: Solve one of the Army's most critical battlefield deficiencies -- reconnaissance security; maintain our technological edge and world class attack helicopter capability into the 21st Century; enhance command, control, communications, and intelligence (C3I), and joint/combined interoperability through battlefield digitization; and sustain our utility/cargo/fixed wing capabilities until upgrade or replacement is possible. Our goal: provide our nation the most capable force within resource constraints.

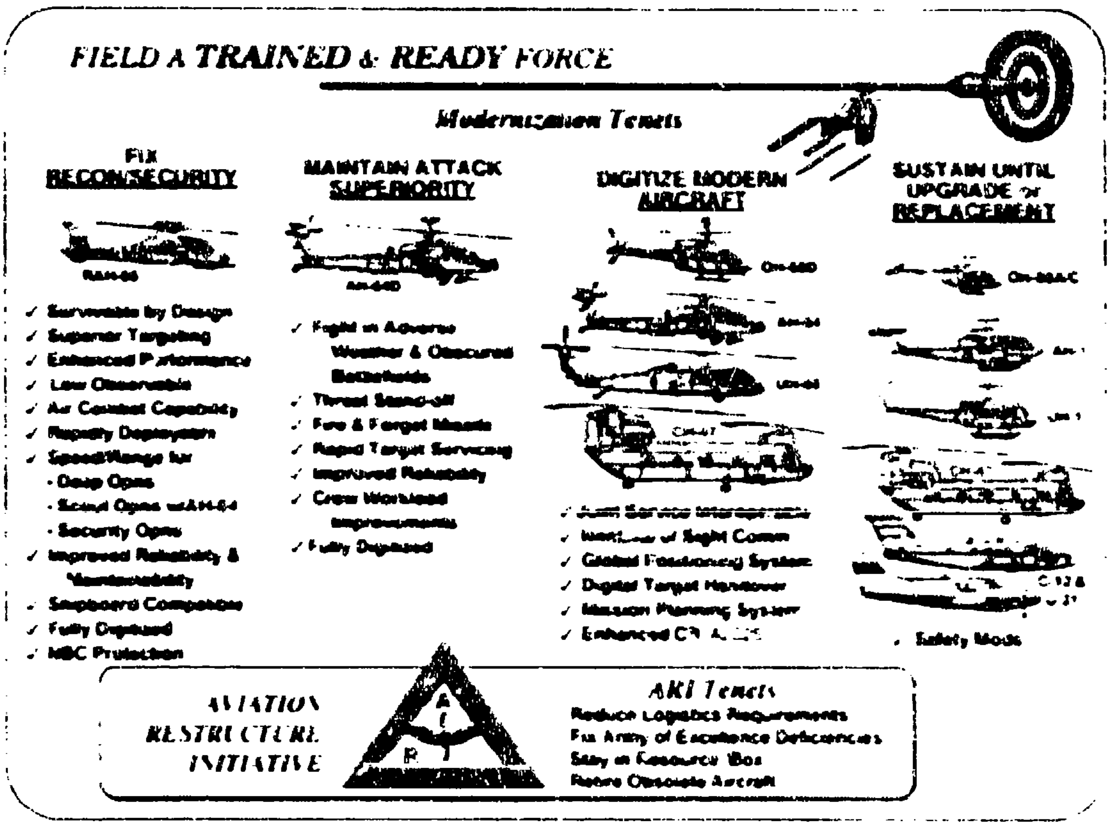


Figure O-2

The Aviation Restructure Initiative (ARI) is the foundation of this plan. It calls for modernizing aviation units to fix organizational and personnel deficiencies, accelerating the retirement of obsolete aircraft, and equipping the objective force with modernized Comanche and AH-64D Longbow Apache aircraft.

The December 1994 Program Decision Memorandum (PDM) IV decremented the Comanche program by limiting it to two flyable prototypes and deferring production. PDM IV has forced the Army to rethink both ARI and the aviation modernization strategy. The tenets of ARI and our modernization strategy remain sound. However, maintaining a balanced modernization plan requires some revisions. A range of options was briefed to the Department of the Army staff in January 1995. Detailed analysis is now ongoing and will culminate with an approved strategy and subsequent update to the aviation modernization plan.

Aviation modernization programs must support the objectives of the Army modernization plan: Project & Sustain the Force, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle. Collectively, they must improve our information gathering capabilities, enhance battle management, and reduce logistics burden.

The U.S. Army remains committed to the RAH-66 Comanche as the centerpiece of its aviation modernization strategy. The Comanche acquires and processes battlefield information with stealth and speed, provides accurate and timely reports to decision-makers using digital data transfer, and responds immediately to tactical situations. It is a key component on the digital battlefield. Additionally, it also provides firepower for early/forced entry operations with contingency/light forces and is capable of closing undetected when scouting for the heavily armed AH-64 Apaches. Until Comanche is fielded, the OH-58D Kiowa Warrior provides some of these capabilities, albeit at reduced effectiveness. Equipped with electro-optical target acquisition and armament, this aircraft has night fighting and armed reconnaissance capabilities neither of which the OH-58A/C or AH-1 aircraft have.

The Longbow Apache gives the Army a more survivable, capable attack helicopter; it represents a quantum leap in lethality, massed firepower, and warfighting in adverse weather and battlefield obscurants. Its millimeter wave fire control radar, fire and forget HELLFIRE missile, precise direction finding to threat RF emitters, and cockpit management and digitization enhancements, give the Army attack helicopter technological superiority into the foreseeable future.

Digitization upgrades to the UH-60 and CH-47 increase their efficiency to deliver troops, ammunition, artillery, and supplies. Further, the intent is to apply digitization to all Army aircraft, enhancing total situational awareness and

reducing the possibility of fratricide. Army aviation will be instrumental in revolutionizing 21st Century warfare. It is a key player in the Army's Force XXI initiative, contributing to the Total Army effort to harness the unprecedented power of the digital battlefield.

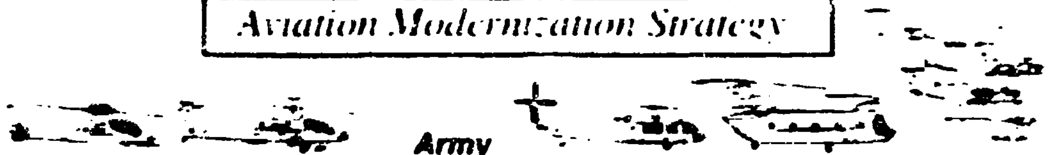
Aviation modernization occurs likewise in supporting "core" programs which provide mission essential equipment, support equipment, and the new technologies required to digitize the force. It also enhances mission survivability, airspace command and control, and aircraft maintainability and supportability. Equally, aviation's training and simulation strategy complements these efforts by harnessing computer technology to make joint/combined arms training possible in the simulator.

While moving to fulfill modernization objectives, the Army must also tackle the pressing problems endemic to its aging, Vietnam era fleet. By the turn of the century, the OH-58A/C, AH-1, UH-1, CH-47, and U-21 will on average be more than 30 years old. Consequently, until these aircraft can be retired, they must be sustained. Sustaining the CH-47D and fixed wing fleets is also required until upgrade/replacement is possible in the next century. The task of maintaining over-aged equipment is unwise economically.

One means by which the Army has addressed the problem of an aging cargo and utility helicopter fleet is through funding requests from the $25 billion plus-up received by the Department of Defense in the President's budget. Additionally, the Army will compete for available resources in the FY 97-02 and subsequent Program Objective Memorandums. These requests support continued procurement of UH-60 Blackhawks and initiation of a program leading to a CH-47D (Follow-on).

Aviation's modernization strategy is far-reaching: it supports each of the Army's modernization objectives; it contributes to the Total Army (involves both Active and Reserve components) and, it focuses squarely on achieving the ultimate goal: Land Force Dominance.

Aviation Modernization Strategy



RAH-66	AH-64D	Army Modernization Objectives	UH-60	CH-47	All Fixed Wing
✔		Project & Sustain	✔	✔	✔
✔	✔	Protect the Force			•
✔	✔	Win Info War	✔		✔
✔	✔	Precision Strikes			
✔	✔	Dominate Maneuver	✔	✔	

LAND FORCE DOMINANCE

* SEMA

Figure O-3

SECTION 2

WARFIGHTING CONCEPT

Aviation's contribution to Army warfighting is directly related to the priorities, focus, and operational tempo outlined in the U.S. National Military Strategy. Its emphasis on forward presence and rapidly self-deployable CONUS based forces, on Operations Other Than War (OOTW), and on crisis response dictates mobile forces with robust capabilities—characteristics of Army aviation. Aviation's inherent versatility enhances the efficiency and effectiveness of all combat functions (maneuver, intelligence, fire support, battle command, mobility and survivability, air defense, logistics), and brings unique capabilities to the fight—capabilities that complement both combined arms and joint operations.

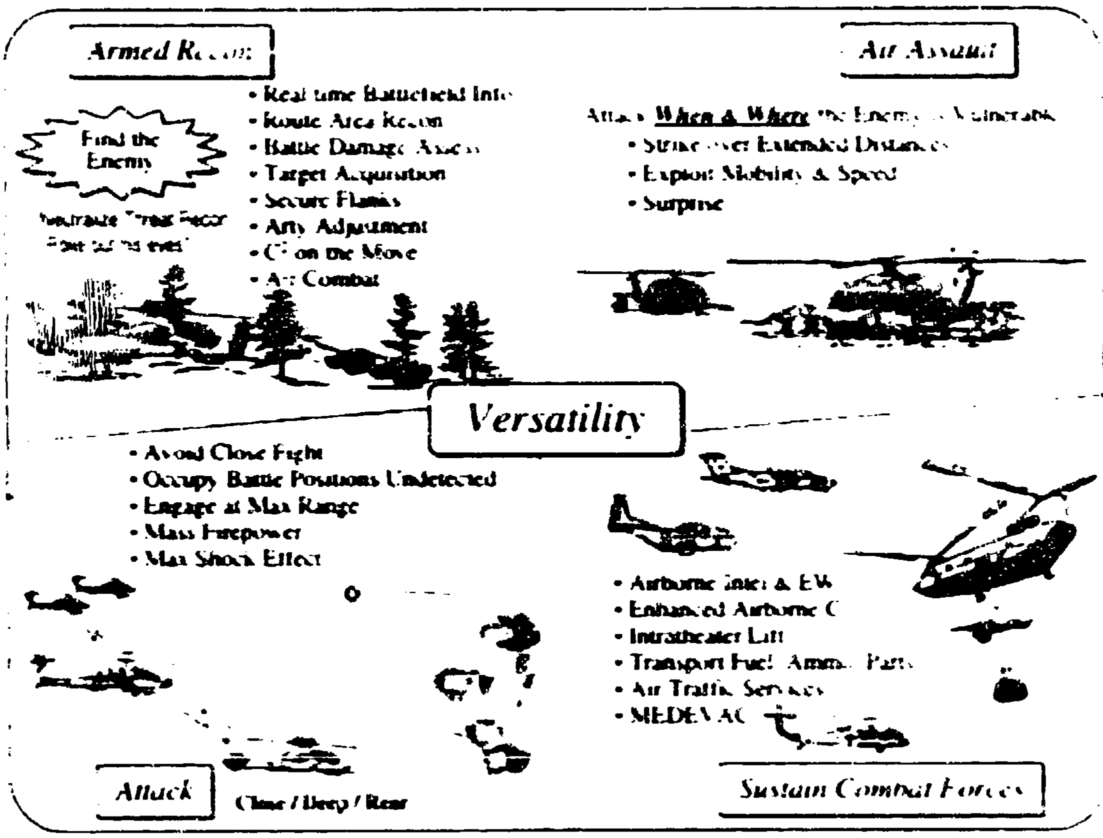


Figure O-4

Operations Other Than War (OOTW). Army aviation is integral to mission specific force packages for OOTW. Air cavalry units can conduct reconnaissance and security operations to provide required critical intelligence, and early warning, and later, offer force protection. Attack helicopters give joint task force commanders an important deterrent asset; if the use of force is

necessary, modernized attack helicopters deliver precision fires with minimal collateral damage. Utility and cargo helicopter units are the backbone of the fleet and historically are the first to respond to contingencies, especially humanitarian assistance missions. Fixed wing aircraft provide essential combat support and combat service support: operational airlift, intelligence and electronic warfare, medical evacuation, and intratheater personnel/cargo transportation. Air Traffic Services deploy to re-establish safe aviation operations and airspace command and control at damaged civilian airports and airfields. Collectively, aviation provides speed, mobility, and flexibility to ground forces, whether in improved or inadequate areas of the world; aviation forces are not deterred by the lack of adequate infrastructure, particularly roads. Sustaining deployed aviation forces in OOTW creates special challenges, particularly because current organizational structures do not allow adequate tailoring of logistics support force packages. However, such issues are being addressed. Aviation is seeking ways to make units more modular and tailorable. The ability to rapidly deploy and employ aviation forces further cements their inseparable bond to any OOTW contingency: whenever and wherever U.S. troops are on the ground, regardless of their role, Army aviation is certain to be there.

Aviation Warfighting Operations. Army aviation is a combat arm capable of maneuver and fire support. It provides an extension of combat power throughout the commander's area of operation or battle space. Aviation operations are integral to the ground commander's concept of operations; they maneuver in concert with ground combat forces. Army aviation accomplishes missions throughout the battlefield: it supports deep, close, and rear operations, and it capitalizes on its capabilities to fight and win at night. Aviation forces bring to the fight: armed reconnaissance, security, real time battlefield intelligence, force protection, attack helicopter operations, air assaults, combat support, and combat service support operations; significant capabilities which contribute immeasurably to the combined arms effort.

During forced and early entry operations, aviation assets deploy rapidly by strategic air or self-deployment. Its lethality and flexibility demonstrate significant deterrence to would be aggressors. Armed reconnaissance and security operations, essential during the initial phases of lodgment, provide intelligence and early warning to reduce friendly forces' vulnerability and increase their protection until other combat power is available. This is exactly what Comanche is designed to do. Its ease of deployment via strategic aircraft, and its 1,260 nautical mile self-deployment capability make it invaluable for contingencies worldwide. Maintenance simplicity has been designed into the Comanche to meet the rigorous demands of early entry operations in an immature or non-existent logistics theater.

Air cavalry units provide the critical battlefield information necessary for quick, accurate command decisions. High resolution reporting about terrain, potential routes, and threat disposition and composition allows commanders to

see the battlefield from perspectives not available from strategic or national sources. Counterreconnaissance operations by cavalry forces "poke out the eyes" of the threat, making them vulnerable to our offensive maneuver. Armed reconnaissance missions deny the threat knowledge of the disposition and the intentions of our forces, and keep the threat off guard -- to force the threat to make poor decisions (e.g., react too late or in ineffective ways) and determine the intent, will, and capabilities of the threat.

Attack helicopter units mass firepower by maneuvering throughout the depth of the battlefield, allowing commanders to expand the battle space, reduce the time needed to move decisively against threat forces, and bring decisive combat power to bear at the critical time and place. Attack units avoid the close fight by engaging the threat at survivable standoff ranges, by massing firepower, by dictating the tempo of the battle and by fighting at night. The requirement to "close with" threat forces, is significantly reduced by aviation's capability to engage at maximum stand-off ranges and penetrate deep into threat areas. Aviation is capable of theater missile defense and precision strikes against other high value targets -- providing killing power and immediate battle damage assessment.

Air assault forces provide significant maneuver capabilities. In contingency operations, air assaults overcome obstacles, assist the seizure of critical terrain, and perform follow-on and support missions to preserve the momentum of attack. Air assault is the primary means of rapid maneuver for light forces and, in many cases, the primary means of deployment directly into combat. Air assault forces also provide for versatile sustainment of the ground troops. The UH-60 Blackhawk is the primary air assault aircraft, augmented by the large scale lift capacity of the CH-47D.

The versatility of Army aviation is exemplified by its numerous **combat support** and **combat service support** capabilities. Utility and cargo aircraft provide tactical air movements of combat forces and their assets. Aviation enhances command and control by allowing commanders, staffs, and liaison teams to rapidly traverse and see the battlefield. Aviation forces provide a variety of airborne intelligence gathering and electronic warfare platforms, conduct offensive and defensive mine operations, support Army and multiservice forces in downed aircrew recovery operations, and assist fire support operations with elements which can acquire targets and adjust indirect fires. Army fixed and rotary wing aircraft transport key personnel and equipment in the theater. MEDEVAC aircraft quickly recover casualties and transport them to medical facilities. CH-47D units, a corps level asset, provide enormous sustainment capabilities in the corps area of operations. Air traffic services facilitate the safe and coordinated use of airspace at all operational levels, supporting enroute and terminal operations. Aviation combat service support includes personnel movement; medical evacuation; movement of critical supplies and equipment.

transportation of fuel and ammunition, battlefield recovery, and organizational, intermediate, and depot-level maintenance operations.

Air Traffic Services. Army aviation Air Traffic Services (ATS) support force projection and worldwide commitments. These specialized units support all types of fixed and rotary wing aircraft whether from U.S. sister services, the host nation, or multinational forces. Army ATS conducts operations across the battle continuum, from Forward Arming and Refueling Points in the field to air traffic control (ATC) at fixed airports in theaters of operation. Army ATS coordinates Army Airspace Command and Control (A2C2), reconstitutes emergency airspace systems; installs, operates, and maintains navigation aids and ATC tower facilities; provides instrument meteorological conditions (IMC) recovery on the battlefield; and supports drop zone operations during parachute assaults and airborne resupply operations. Whether in OOTW or combat, Army ATS is a vital member of the combined arms team; its capabilities are essential to force projection, protection, and sustainment operations. Modern digital ATS systems, presently in development and acquisition, significantly improve such capabilities.

Joint and Multinational Operations. These operations are now the norm, both in OOTW and war. Army aviation makes significant contributions to joint and multinational operations by exploiting the aerial dimension of the battle space. The full range of capabilities available can generate a variety of challenges regarding interoperability (both procedural and equipment compatibility), command and control structures, clearly defined and understood rules of engagement, and education of joint/multinational leaders on proper use of Army aviation. Digitized aircraft, and command and control infrastructures, offer truly joint capabilities; designed with hierarchical communications structures interconnected with USN and USAF systems. The RAH-66 is the first Army aircraft which meets USN specifications for shipboard electronic emissions; Thus it provides the Army greater early entry flexibility and complementary support to the USMC.

Special Operations Aviation. The Army aviation component of Special Operations Forces (SOF) is the 160th Special Operations Aviation Regiment. Army Special Operations Aviation (SOA) aircraft provide insertion/extraction, reconnaissance gathering, light attack, resupply, and other SOF support during operations. Combat developments, funding, and management of these systems are the responsibility of the U. S. Special Operations Command (USSOCOM). Current SOA assets include the AH/MH-6, MH-60L, and the MH-47D. The AH/MH-6 is a hybrid militarized variant of a McDonald Douglas 500 Defender. Enhancements include second generation (2d gen) Forward Looking Infrared (FLIR), SATCOM long range communications, and improved navigation suite. The attack version fires the 7.62mm mini-gun, 2.75" Folding Fin Aerial Rockets (FFAR), and HELLFIRE. The MH-60L and MH-47D are modernized with a partially integrated avionics suite, 2d gen FLIR, and long range SATCOM communications. Some MH-47D helicopters have aerial refuel probes for

improved self-deployment. The SOA acquisition program provides 23 MH-60K and 26 MH-47E helicopters and two combat mission simulators. MH-60K and MH-47E enhancements include a fully integrated avionics suite and improved navigation capabilities (which include digital mapping and multi-mode radar (MMR)). The MMR features terrain following and terrain avoidance (TF/TA) capabilities. These aircraft are equipped with air to air refueling probes. The MH-47E has a fully coupled flight control system that allows hands-off flight. Modernization programs provide adverse weather, and extended range capability for low visibility penetration and infiltration of enemy territory in support of SOF operations. SOF modernization requirements are detailed in Annex T.

Intelligence and Electronic Warfare. Intelligence and Electronic Warfare (IEW) requirements are met by Special Electronic Mission Aircraft (SEMA). The airborne IEW missions include surveillance and photographic reconnaissance, Electronic Intelligence (ELINT), Communications Intelligence (COMINT), and Electronic Countermeasures (ECM). The current SEMA fleet consists of the RV-1D, OV-1D, Improved Guardrail V, Airborne Reconnaissance Low (ARL), and RC-12N Guardrail Common Sensor fixed wing aircraft and the EH-60A Quick Fix IIB rotary wing aircraft. Future SEMA include the EH-60 Advanced Quick Fix, and Aerial Common Sensor. IEW operations and requirements are contained in Annex G.

Aviation Digitization. One of the Army's top priority requirements is "Digitizing the Battlefield" to provide seamless digital command and control capabilities throughout the fighting force. The goal is to use digital technology to maintain a continuous edge in projecting and employing combat power. Aviation's digitization vision is based on enhancing three warfighting capabilities: situational awareness, C3I, and operational tempo. Aviation's six core digitization programs (High Frequency Nap of the Earth Communications, Global Positioning System, HAVEQUICK II, Army Airborne Command and Control System, Improved Data Modem, and Aviation Mission Planning System) provide the gateway for aviation to play a major role in the digitized Force XXI battlefield. These programs, combined with the integrated digital architectures available on the AH-64D and RAH-66, allow aviation to acquire, exchange, and employ timely digital information throughout the battle space.

Organization for Combat

In 1985, the Army significantly reduced the number of personnel in critical aviation warfighting and logistic support positions. The reductions were not accompanied by corresponding reductions in aircraft or mission requirements. This created severe shortcomings in warfighting capability, principally, manning command and control headquarters and sustaining 24 hour operations for more than a few days. Further, many critical maintenance positions became "one deep" and could not support the required OPTEMPO. In fact, some positions were resourced only to 60% of requirements. The Aviation Restructure Initiative

(ARI) (planned and approved for implementation in FY93) will correct these deficiencies when fully implemented. It develops adequately staffed organizations, reduces logistics requirements by standardizing units (which minimize the number of different aircraft), and lowers the "cost of ownership" by accelerating the retirement of obsolete aircraft (such as the UH-1, AH-1, and OH-58). Improved efficiency can be attained with fewer personnel and less equipment; in fact, significant reductions have already been made. Other fixes include materiel handling equipment (MHE) and improved equipment for forward area refueling, increasing deployability and improving turn around time. ARI improves warfighting capability and enhances supportability. Figure O-5 provides the objective rotary wing aircraft requirements based upon aviation's modernization strategy and ARI under the 4 Corps, 18 Division Total Army force prior to the Program Decision Memorandum IV affecting the Comanche program.

The Joint Venture portion of Force XXI, discussed in the Executive Summary to this Army Modernization Plan, may prompt changes to ARI. These changes will be captured in a revised initiative called Aviation Restructure Initiative XXI. It will retain the basic tenets of the original ARI and incorporate new thinking as outlined in TRADOC Pamphlet 525-5, Force XXI Operations. Modularity and tailorability will be key to ARI XXI organizations. ARI XXI will be discussed in greater detail in subsequent aviation modernization plan updates.

Pre PDM IV Requirements

	RAH-66	AH-64		UH-60 A L	LUH	CH-47	TOTAL
	1062	616	*Aircraft in TOE Units*	1509	96	360	3643
	377	142	*Float, Attrition, TDA & Training*	536	35	128	1218
	1439	758*	*Total Requirements*	2045**	131	488***	4861

* [illegible]

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Figure O-5

Figure O-6 depicts unit structure for the basic building blocks of the aviation force under ARI. It also shows the impact to the aviation modernization strategy if Comanche production is deferred indefinitely, and if the requested funding for continued UH-60 procurement and CH-47D Follow-on efforts is not obtained.

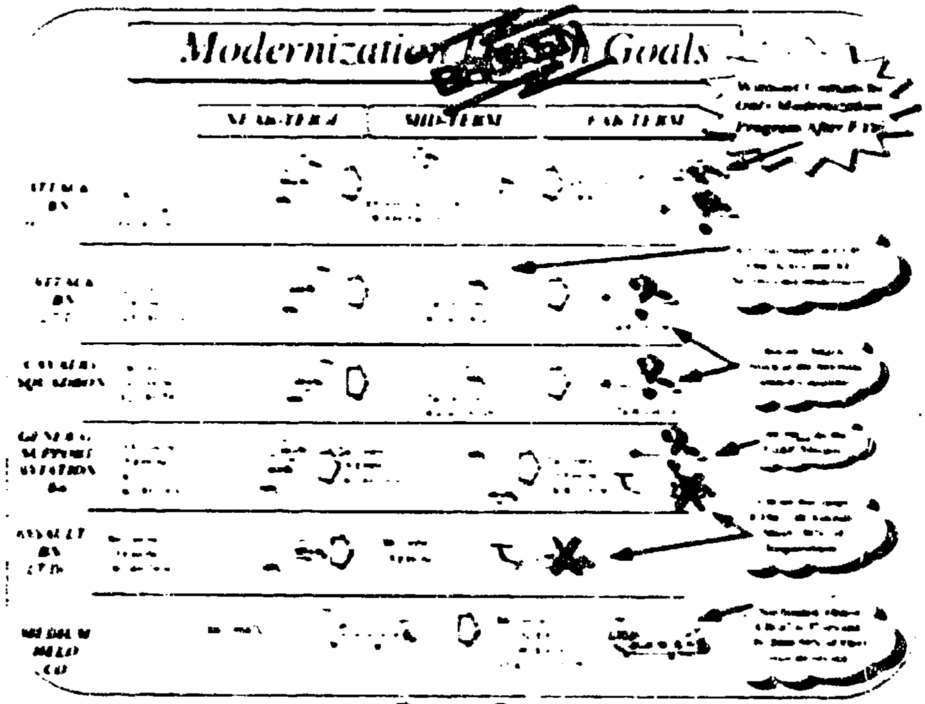


Figure O-6

Figure O-7 graphically portrays the current rotary wing fleet. The aviation rotary wing modernization strategy objective is to reduce the fleet to a total of 4 modernized airframes. ARI XXI and objective strategy decisions will drive the details of how this objective is reached. Variables include aircraft requirements and retirement schedules, procurement rates for modernized systems, and potential force structure changes.

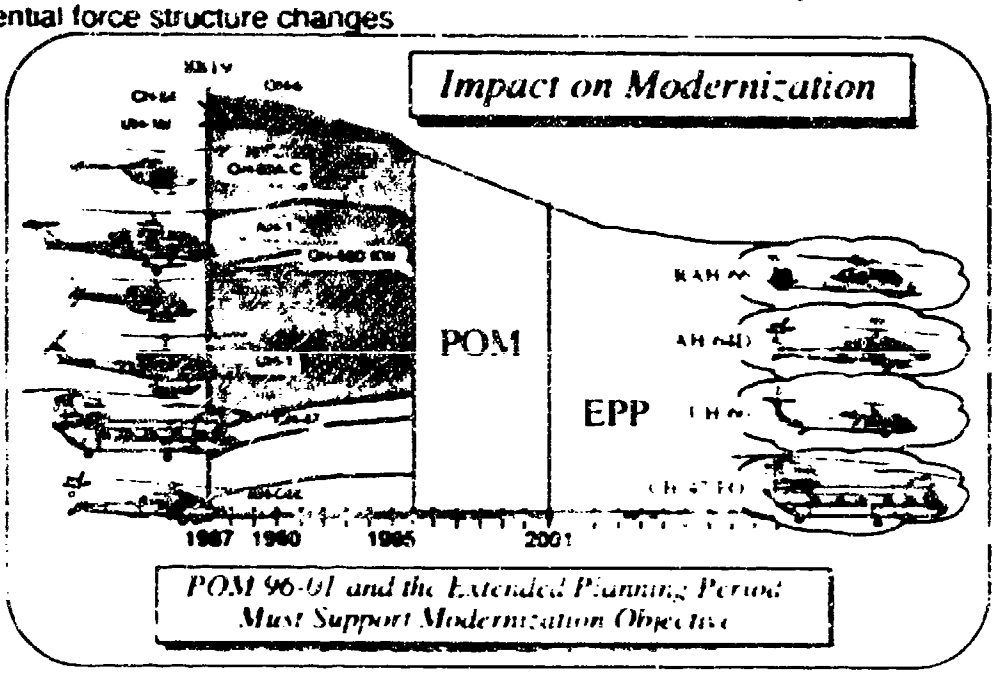


Figure O-7

The fixed wing modernization design goals are shown in Figure O-8. This strategy, detailed in the approved Fixed Wing Investment Strategy (FWIS), recommends four standard platforms to satisfy short and medium range utility, executive transport, and multimission requirements.

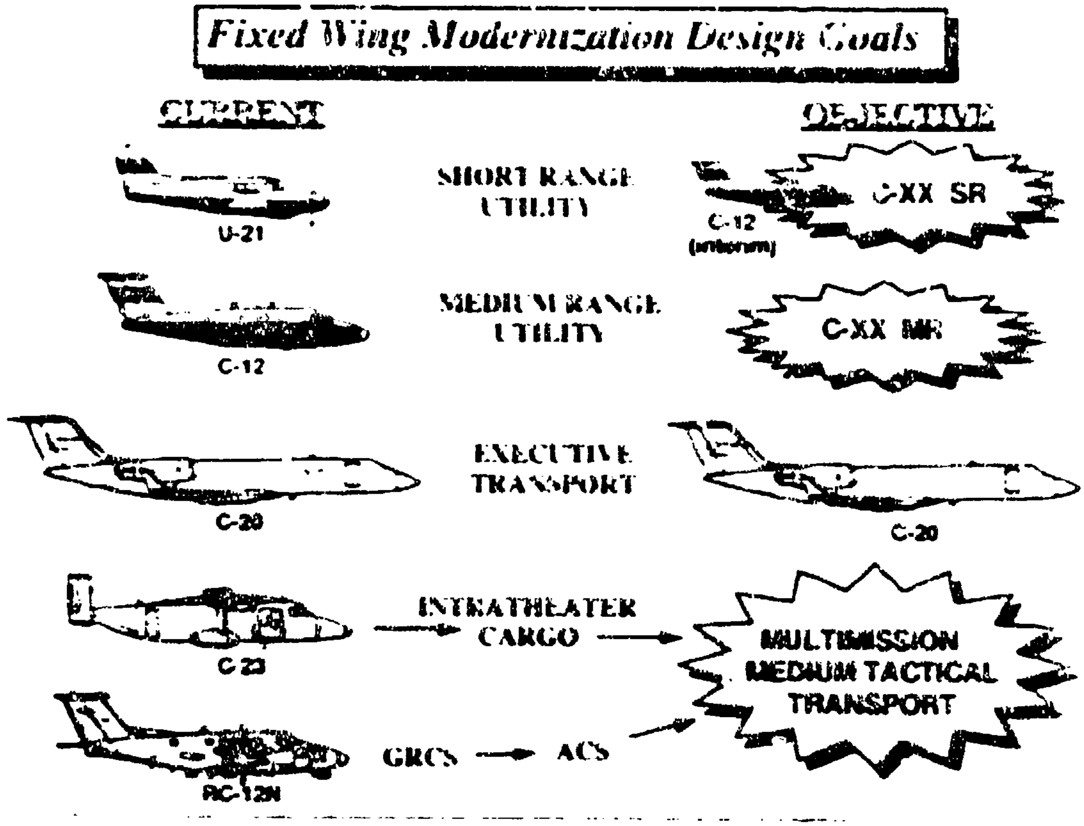


Figure O-8

Conclusion

Army aviation is preparing to meet tomorrow's challenges by modernizing forces, developing warfighting doctrine, and creating force designs flexible enough to win decisively across the full range of military operations. However, the impact of fiscal realities remains a significant factor and is discussed in Sections 3 and 4. The Army in 1996 will be nearly a third smaller than the Army of 1991. Force modernization recognizes the dichotomy of a peacetime economy versus warfighting effectiveness. Aviation's lethality, versatility, and deployability offer the "return on investment" critical to the Army's investment strategy and future mission successes.

SECTION 3

CURRENT PROGRAM ASSESSMENT

In this section, the capabilities described in the warfighting concept are assessed using the following criteria

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission, and;

GREEN -- Adequate capability and quantity exists to perform the mission.

This assessment examines capabilities from the standpoint of where we are now (the near-term force), where our modernization plan eventually leads us (the far-term force), and the force which bridges the gap between the two (the mid-term force). Each are viewed through the perspective of time. Near-term--FY 95-96, mid-term--FY 97-00, and far-term--FY 01-09.

The assessment charts (Figures O-9 through O-16) show our various aircraft systems and a shaded assessment on a bar scale. The ruler which appears adjacent to these scales is meant to graphically portray an unprioritized list of capability requirements for that particular mission area. Comparing the requirements on the ruler below the height of each bar provides an indication of the capabilities offered by each alternative.

Reconnaissance and Security. The results of force-on-force training at the National Training Center (NTC) show an 85% correlation between the effectiveness of reconnaissance and the outcome of battles. Fixing reconnaissance and security deficiencies is Army aviation's number one priority. Figure O-9 provides an assessment of air cavalry troop capabilities to conduct reconnaissance and security in the near-term, mid-term and far-term periods.

The AH-1/OH-58A/C team is **RED**. Both aircraft lack the capabilities to operate effectively at night and in reduced visibility, neither have adequate flight performance for global operations, and both do not have adequate targeting sensors. The average age of these Vietnam era airframes is greater than 25 years, exceeding the 20-year useful life criteria (based on technological obsolescence and average annual flight hours). The near-term marginal capability of this "day only" team continues to diminish in the years as threat technologies advance and supportability problems emerge. The longer modernization is delayed, the more supportability costs and warfighting risks will increase. Unfortunately, current resource constraints keep these aircraft in the fleet well into the 21st Century. The OH-58D Kiowa Warrior is a significant improvement over the AH-1/OH-58A/C team and bridges the gap as a mid-term measure in high

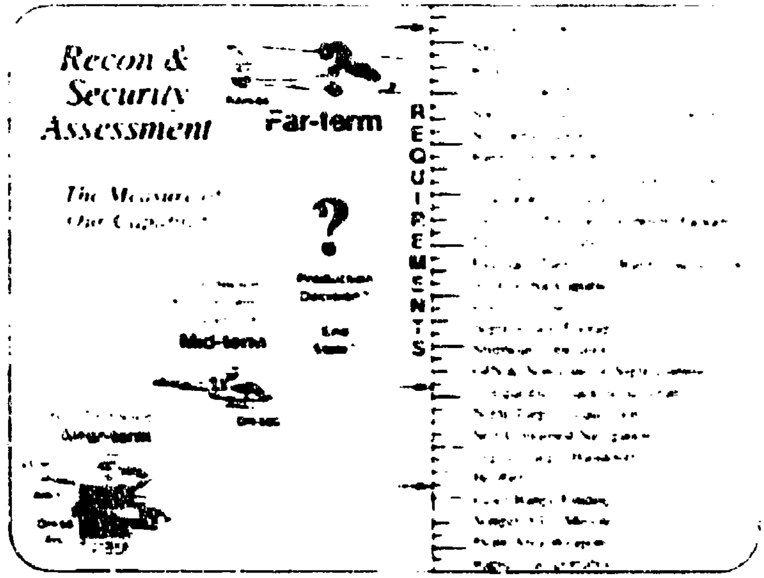


Figure O-9

priority units until the Comanche production decision is attained. However, as shown in Figure O-10, the Kiowa warrior offers extremely limited physical growth potential. The mid-term reconnaissance/security fleet is **AMBER**, due to these deficiencies. Although upgrades, principally digitization, are programmed to improve mission equipment performance, improving this system to meet the full range of cavalry/light attack missions is cost prohibitive because of weight, space, power, and range limitations. The RAH-66 Comanche, with its superior mission equipment, advanced survivability features, and unprecedented maintainability can solve our reconnaissance and security deficiencies and meet National Military Strategy requirements and Force XXI goals. The Comanche can provide immediate tactical targeting, prioritization, and enemy type and location information to tactical commanders (just as JSTARS does on a larger, but less defined scale for commanders at the operational level of war).

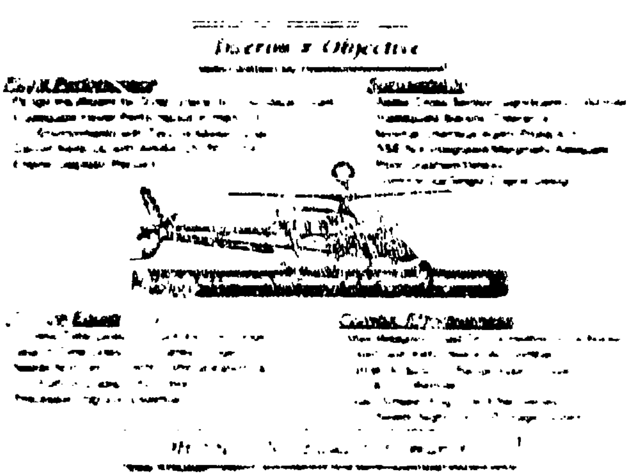


Figure O-10

Attack. Figure O-11 shows the assessment of our attack helicopter capability. The attack mission is currently performed by two different scout attack teams. In some divisions, AH-1/OH-58A/C (assessed **RED**) aircraft continue to perform the attack mission. The primary light division attack team, these aircraft fight blind at night (with the exception of limited quantities of AH-1F C-Nite aircraft, and lack the weapon systems and mission equipment required for effective combat operations. Averaging more than 25 years in age, this team is becoming increasingly unsupportable in terms of maintenance and survivability. The mid-term OH-58D Kiowa Warrior, when fielded to light division attack battalions, is rated **AMBER** (Figure O-11). In other units, the more capable AH-64/OH-58A/C team is **AMBER** primarily due to limitations of the OH-58 scout. ARI creates attack battalions of only one aircraft type, retires obsolete OH-58A/Cs, and reduces the logistics burden on attack units. Fielding the RAH-66 Comanche would overcome the OH-58D deficiencies in light divisions and the AH-64 scout deficiencies in heavy division/corps attack battalions.

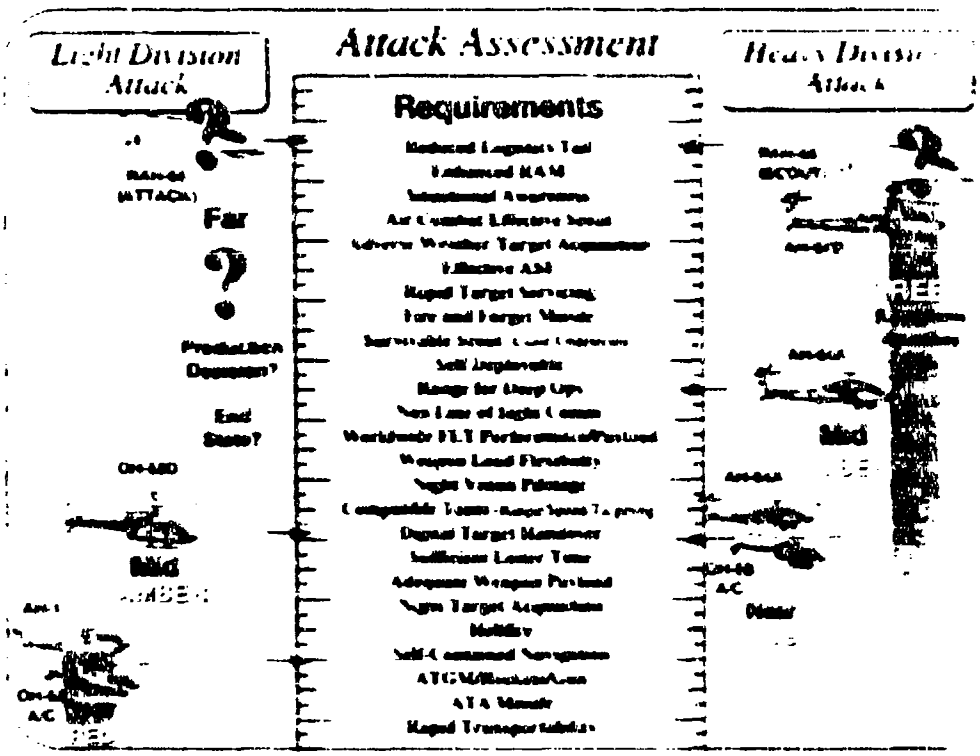


Figure O-11

While the AH-64A (current non-Longbow equipped Apache) provides a vastly improved scout capability (compared to the OH-58A/C), aircraft design limits its effectiveness in the scout role (Figure O-12). Despite digitization and other modernization initiatives, these aircraft remain vulnerable to modern threat air defenses (especially the AH-64 when used in the scout role), and do not address their workload intensive mission equipment packages. For this reason, the pure AH-64A attack battalion is **AMBER**. Many such deficiencies are corrected with the introduction of the AH-64D Longbow Apache providing the adverse weather target acquisition of the

Longbow radar and the [illegible] Longbow Apache will increase firing rates [illegible] and survivable. Still, despite the [illegible] attack fleet has the [illegible] light division attack battalions. [illegible] OH-58A/C team and the [illegible] Longbow as the scout aircraft [illegible] attack team survivability [illegible]

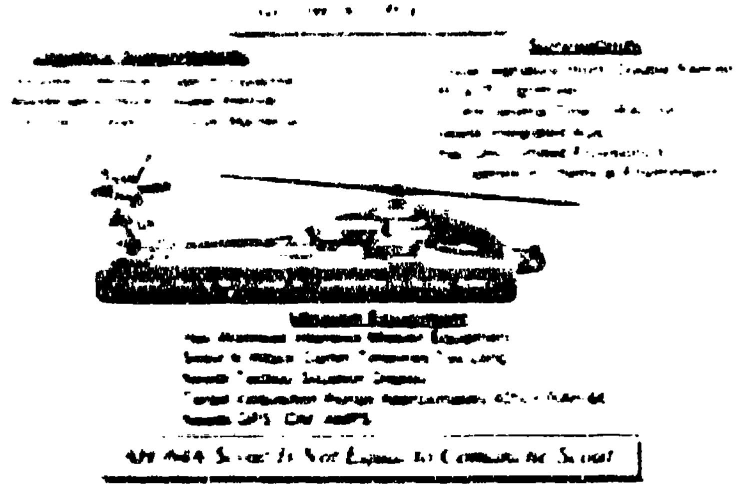


Figure O-12

Utility. The utility assessment is depicted in Figure O-13. The near-term utility fleet is **AMBER**. The UH-1H (assessed **RED**) is an old airframe which possesses inadequate lift, speed, and range. The UH-60A/L, on the other hand (assessed **AMBER** due to limited quantities), is a solid performer with excellent deployability, survivability, and maintainability. This workhorse of Army aviation has proven itself

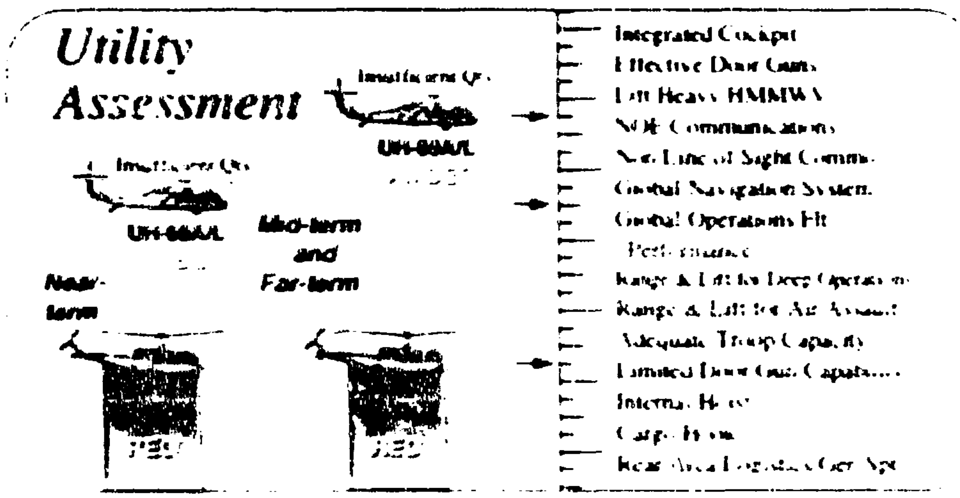


Figure O-13

in combat from Grenada to Somalia. In its assault role, the UH-60 Black Hawk allows light forces to dominate the maneuver battlefield. During air assaults or in support of deep operations, the Black Hawk allows friendly forces to penetrate or bypass obstacles and terrain barriers, strike over extended distances, and attack the threat when and where he is most vulnerable. The UH-60 Black Hawk is self-deployable air transportable, and it enhances light forces operational tempo during maneuver, increases mobility of troops and equipment, improves aero medical evacuation, extends logistical support capability, and serves to synchronize the battlefield. In its command and control role. Digitization of the utility fleet and continued refurbishment of older A models carry it into the 21st Century. However, additional aircraft procurement is necessary to fully meet MEDEVAC and utility requirements.

- The UH-1V MEDEVAC (assessed **RED**) lacks the speed, range, and endurance to adequately support maneuver forces. It is over-age, maintenance intensive, and marginally reliable. These shortfalls are further magnified during high/hot environment operations (above 4,000 feet and 95 degrees).

The Light Utility Helicopter (LUH) is projected to fill the TOE mission role of performing flights for staff transport, liaison, air messenger service, and air movement of supplies. Additionally, the LUH augments Corps air ambulance resources. The airframe for the LUH role has not yet been identified. The LUH requirement is for three battalions of 32 aircraft each. In the mid-term, the UH-1 will fill the LUH requirement.

Cargo. The cargo fleet assessment is depicted in Figure O-14. The CH-47D is currently **GREEN**. It provides adequate lift capabi and is available in adequate numbers to support current mission requirements. nor enhancements to digitize and to improve supportability and payload capacity are quired. By the turn of the century these airframes reach 40+ years in age. The objective is an upgrade/service life extension or replacement, depending on out year funding. Studies and analyses of these options continue. Funding will continue to challenge this issue.

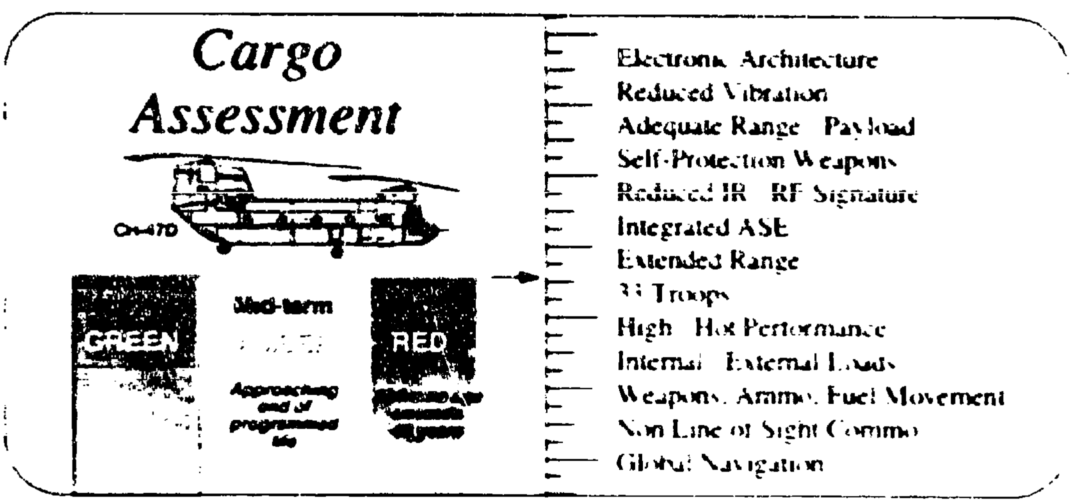


Figure O-14

Fixed Wing The assessment of our fixed wing fleet is shown in Figure O-15

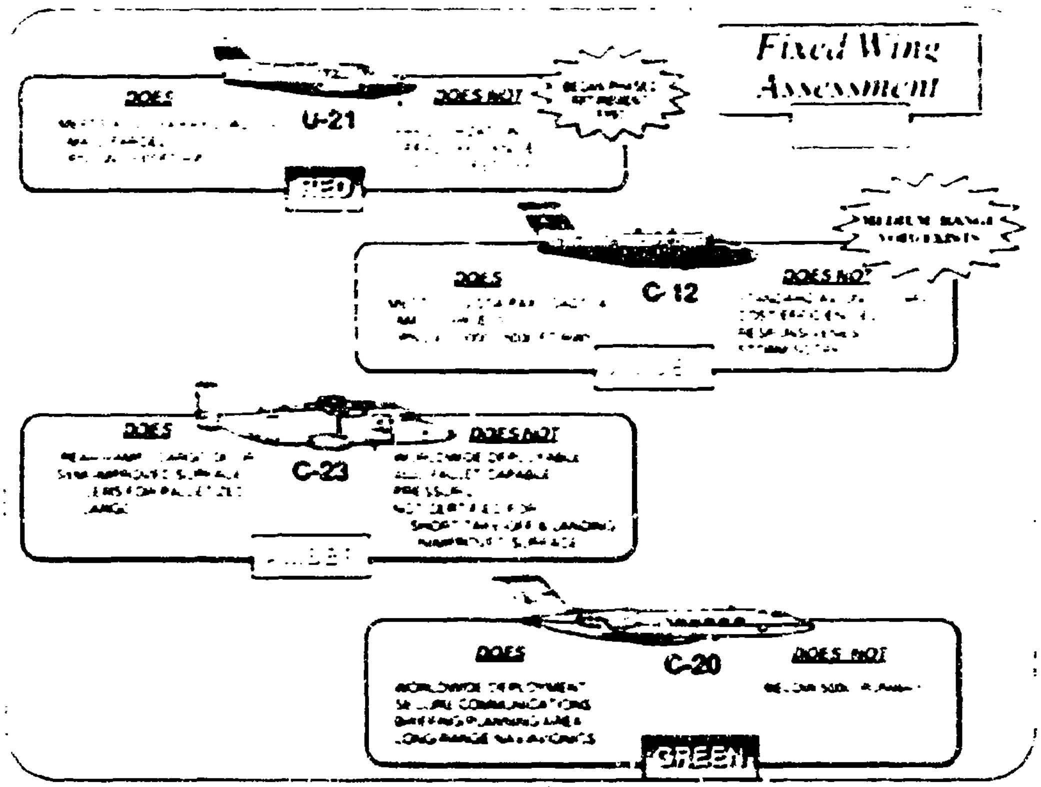


Figure O-15

The Army's fixed wing fleet consists of 21 different airplanes. This diverse and varied fleet is increasingly difficult to manage and modernize and is expensive to operate and sustain. Additionally, the lack of a standardized fleet and the numerous cockpit configurations represented by these myriad airplanes adversely impact upon training and operational standardization.

To address the problems associated with sustaining and providing standardization for 21 different models of fixed wing aircraft, the Army's Fixed Wing Investment Strategy (FWIS) reduces the fleet to four types. The C-XX Short Range (SR), C-XX Medium Range (MR), C-20 Long Range (LR), and the Multi-Mission Medium Tactical Transport (M3T2) aircraft. The C-XX (SR) conducts missions less than 500 nautical miles (nm). The C-XX (MR), a nondevelopmental jet type aircraft, conducts missions up to 1800 nm range. Currently, the C-12 performs both missions and requires two days to complete the 1800 nm mission. The C-20 (LR) performs senior executive transport up to 4200 nm. The C-23 currently fills a CINC Support Aircraft (CSA) requirement but does not have the payload, range, or speed desired for the Army's future M3T2 needs. The C-26 provides troop and cargo transport for the National Guard, but does not fully meet the M3T2 requirement. The FWIS must be resourced and supported in order to attain a green rating.

The C-12 (assessed **AMBER**) begins to reach the end of its useful life in FY 09. An avionics upgrade is needed in the near-term to standardize the myriad cockpit configurations in the C-12 fleet. This upgrade ensures the C-12 fleet is capable of operating in the National Airspace System and has the required data communications links to operate on the digitized battlefield of the 21st Century. The U-21 (assessed **RED**), a less capable aircraft approaching 30 years in age and now in phased retirement, may remain in service indefinitely to make up for the limited quantities of C-12 aircraft.

High Capacity Air Ambulance (HCAA) HCAA requirements were previously tied to the Multi-Mission Medium Tactical Transport as outlined by the Fixed Wing Investment Strategy. Recent decisions have established HCAA as a separate requirement. Materiel solutions may be pursued after approval of an operational concept and Mission Need Statement, and after rotary wing MEDEVAC fleet modernization.

Conclusion. Assessment of aviation capabilities by major mission areas (recon/security, attack, utility, cargo, utility fixed wing) for near-term, mid-term, and far-term forces are shown in Figure O-16. The Comanche and Apache Longbow helicopters solve reconnaissance and attack deficiencies; they remain Army aviation's major focus to correct critical warfighting shortfalls. However, continued procurement of UH-60 Blackhawks, development of a CH-47D Follow-on, and continued modernization of core programs are equally important to a balanced strategy; we must not allow obsolescence of our utility, cargo, and fixed wing fleets.

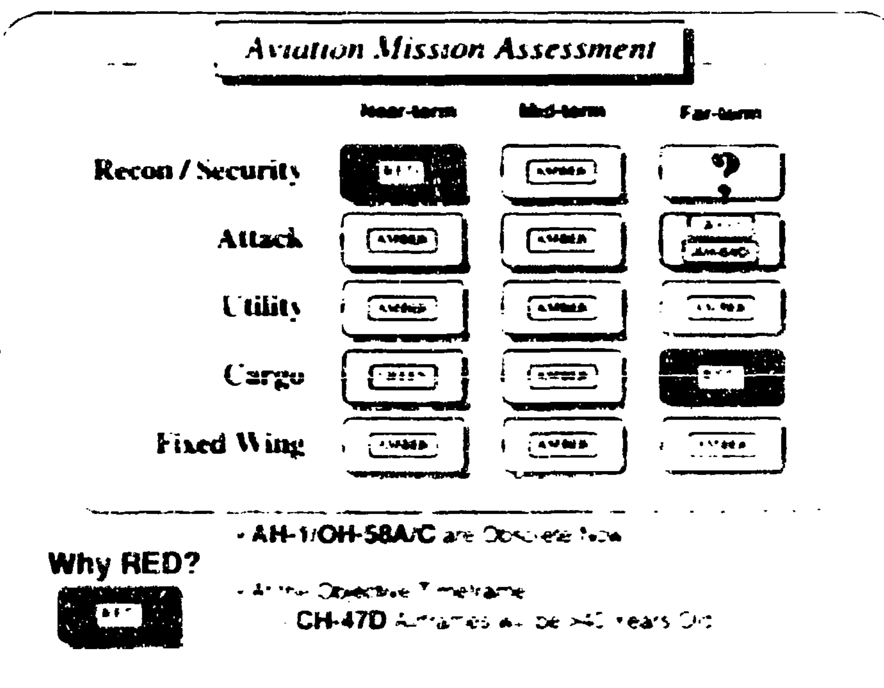


Figure O-16

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION

Aviation RDA Strategy The Research, Development and Acquisition (RDA) strategy for Army aviation involves four process steps: sustain, improve, develop and procure, and retire aircraft. The first step evaluates the current fleet's capability to meet warfighting requirements. If it meets required needs, the fleet is sustained by safety and RAM c upgrades to achieve operational and supportability cost reductions and improved sustainability. The second step looks to improve existing systems, to stay inside the opposing force capability, through technology insertions. When neither upgrades nor technology insertions can provide required capabilities, or are too costly, new systems are developed and fielded. As this occurs, old and technologically obsolete aircraft are retired. Inherent in this process is the development of aviation science and technology to enhance aviation capabilities in the next century, and provide the enabling capabilities for future systems.

The Army's RDA strategy for aviation is driven in part by the austere FY 96-01 POM funding and the PDM IV decision regarding the Comanche program (Figure O-17). The objective of this strategy is to apply our limited resources in a manner which maximizes return on investment.

RDA Resourcing

RAH-66
- Only 2 Prototypes in POM
- Production Deferred Beyond FY01

AH-64D
- Modification Begins FY 96 (Ramps to 72 Acft/Yr)
- Procures Longbow Hellfire Modular Missile System
- Begins Funding Longbow Apache Tactical Engagement Simulator System

AH-64A
- RAM & Operation Desert Storm (ODS) Fixes Which Also Support AH-64D Upgrade
- Funds TADS/PNVS and Category B Trainer Upgrades

UH-60
- Minimum Mods to Refurbish/Standardize Pre-1989 UH-60A's
- Terminates Procurement After FY 96

OH-58D
- Commanche Kiowa Warrior Upgrades
- Procures Multipurpose Light Helicopter Mission Kits

CH-47D
- Provides Only Safety and ODS Fixes - Follow-On Deferred
- Continues to Study Alternatives for Cargo Fleet Post-2000

Fixed-Wing Units
- Very Low Rate of Avionics Upgrades (Standardizes C-12)

Core Programs
- Meets Most Critical Requirements for Avionics (Top [illegible] Digitization)
- Continues ASE Efforts for RF and IR Countermeasures
- Sustains Effort to Modernize AGSE & SKO
- Moderate Level of Effort for Tactical ATC [illegible] Fixed Base/NAS

S&T Program
- Sustains Critical Rotary Wing Technologies (Rotorcraft Pilots Associate, Advanced Platform Technologies, Joint Technology Advanced Gas Generator)

Figure O-17

Recon & Security Airframe modernization for our reconnaissance security aircraft is summarized in Figure O-18.

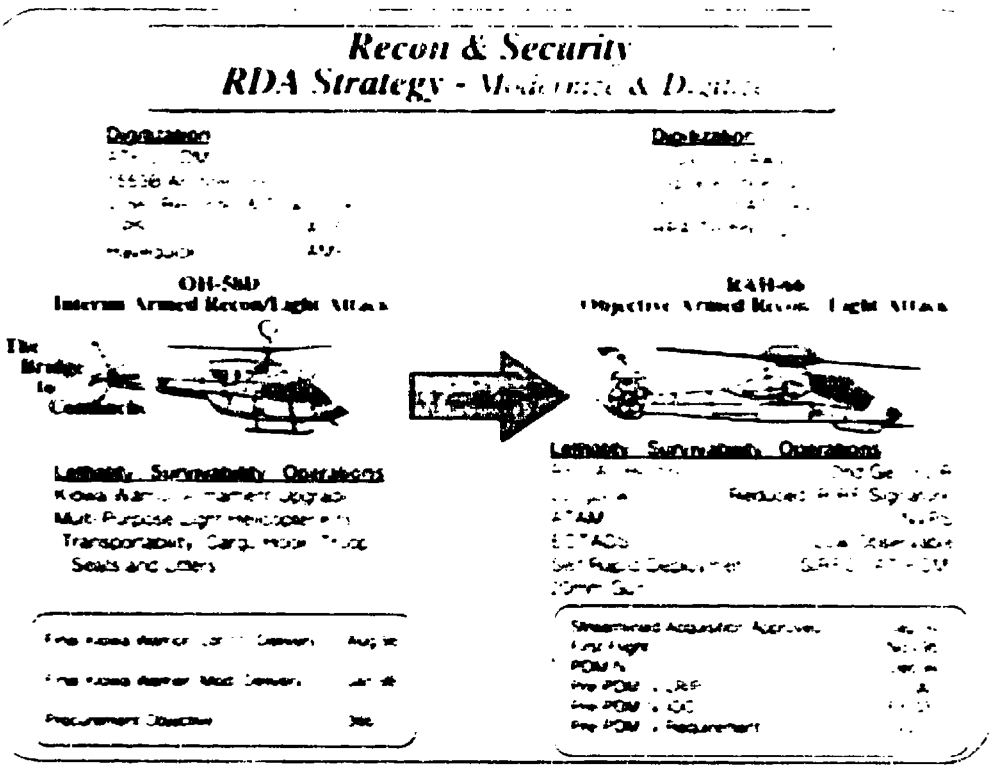


Figure O-18

The Army's primary reconnaissance aircraft (AH-1/OH-58A/C) are **sustained** only until replaced by the interim OH-58D Kiowa Warrior (mid-term) in high priority units and RAH-66 (far-term). The AH-1 is limited to avionics rewire and safety improvements, and sustaining it into the next century (until displaced by OH-58D or RAH-66). Near-term OH-58D modernization completes the Kiowa Warrior retrofit for the remaining fleet (HELLFIRE, Stinger, rockets, .50 caliber machine gun). Selected Multipurpose Light Helicopter kits are also procured at this time. Follow-on upgrades include incorporation of fleet standard digital systems and Reliability, Availability, Maintainability and Enhanced Performance (RAMEP) R2 engine upgrade. The pre-PDM IV RDA strategy for RAH-66 Comanche was 72-120 aircraft per year, depending on affordability rate at production. Analysis of PDM IV impacts on the aviation modernization strategy are continuing and may lead to decisions affecting RAH-66 procurement objectives.

Attack Attack aircraft modernization is summarized in Figure O-19. The mid- and far-term objective is to modify 758 AH-64A to the AH-64D Longbow Apache. This requirement may be less than the far-term fielding requirement depending on RAH-66 distribution decisions. Approximately 1/3 of these AH-64D aircraft must perform the scout role. The AH-64D will approach 25 years in age before the first is retired by Comanche or future attack vehicle. This is due to the resource constraints of a plan to

ramp-up to a maximum of 72 RAH-66 aircraft per year (instead of the desired 120 per year). The reduced acquisition rate, coupled with the considerable shortcomings of the AH-64A as a scout (see Figure O-12), warrants this strategy. Two hundred twenty seven AH-64Ds will be equipped with the Longbow mast-mounted Millimeter Wave (MMW) Fire Control Radar (FCR). All aircraft will receive total electronic integration, precision inertial and GPS navigation, state of the art weapon system and display processors, human factors designed cockpit, joint compatible digitized communications suite, fully automated maintenance manuals, and aircraft reliability improvements. Prior to modifying AH-64D, lessons learned in Operation Desert Storm and RAM modifications will be applied.

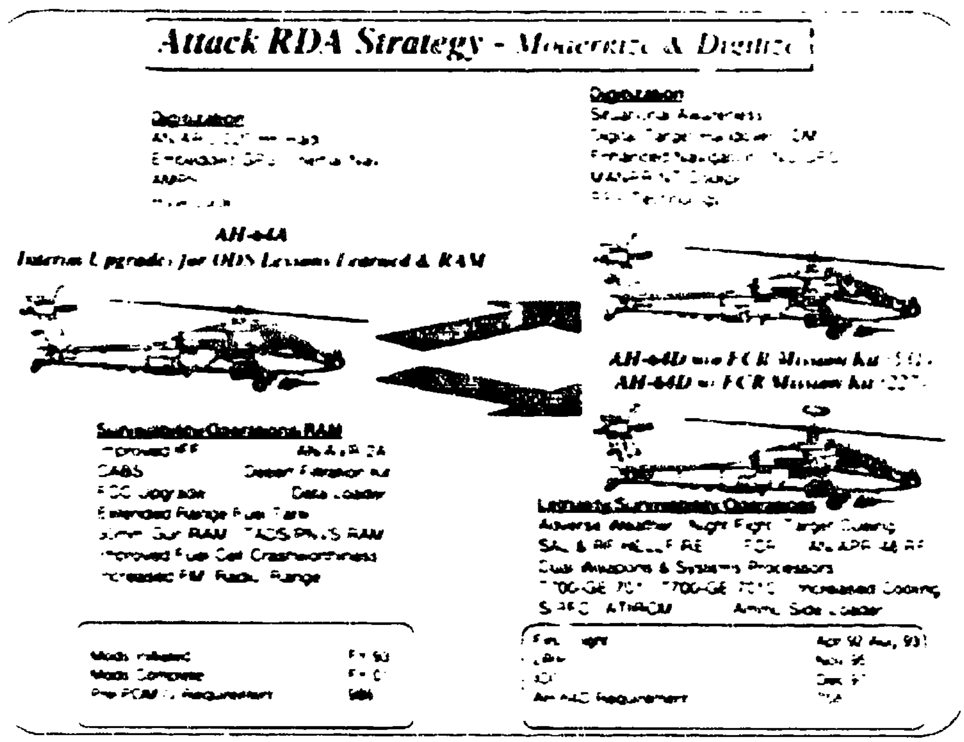


Figure O-19

Utility Utility fleet modernization is shown in Figure O-20. Modernizing the utility fleet involves 2,045 UH-60 (not including SOA or SEMA) and 131 helicopters in the light utility role. The POM terminates UH-60 procurement after FY 96 at 1,390 aircraft (not including SOA and SEMA), requiring over 900 UH-1 helicopters to remain in the fleet. Modernization of the UH-60 continued in FY 94 with the standardization of pre-1989 A-models to the 1989 A-model baseline configuration and the continuing procurement of the Hover IR Suppressor System (HIRSS) and External Stores Support System. Other modernization enhancements include digitization, electromagnetic environment (EME) protection, and improved radar warning. Acquisition and upgrade of selected UH-60s with the Army Airborne Command and Control System (A2C2S) provide corps, division, and brigade commanders an airborne or ground C2 system with sufficient communications, processing, and display equipment for effective command

and control. The system is compatible with ground commanders C2V and other C2 facilities, and provides the flexibility to support a tactical command post battle staff and their carry-on equipment. An unresourced requirement exists for 13? light utility helicopters (LUH) for light cargo, liaison, courier, command support, general support and other secondary tasks. Alternatives for LUH include UH-1 with service life extension program, a commercial off-the-shelf aircraft, or UH-60. An upgraded UH-1 (avionics wiring upgrade) is a potential mid-term fix to the LUH void. The remaining UH-1s are sustained via minimum RAM safety upgrades until retirement is possible.

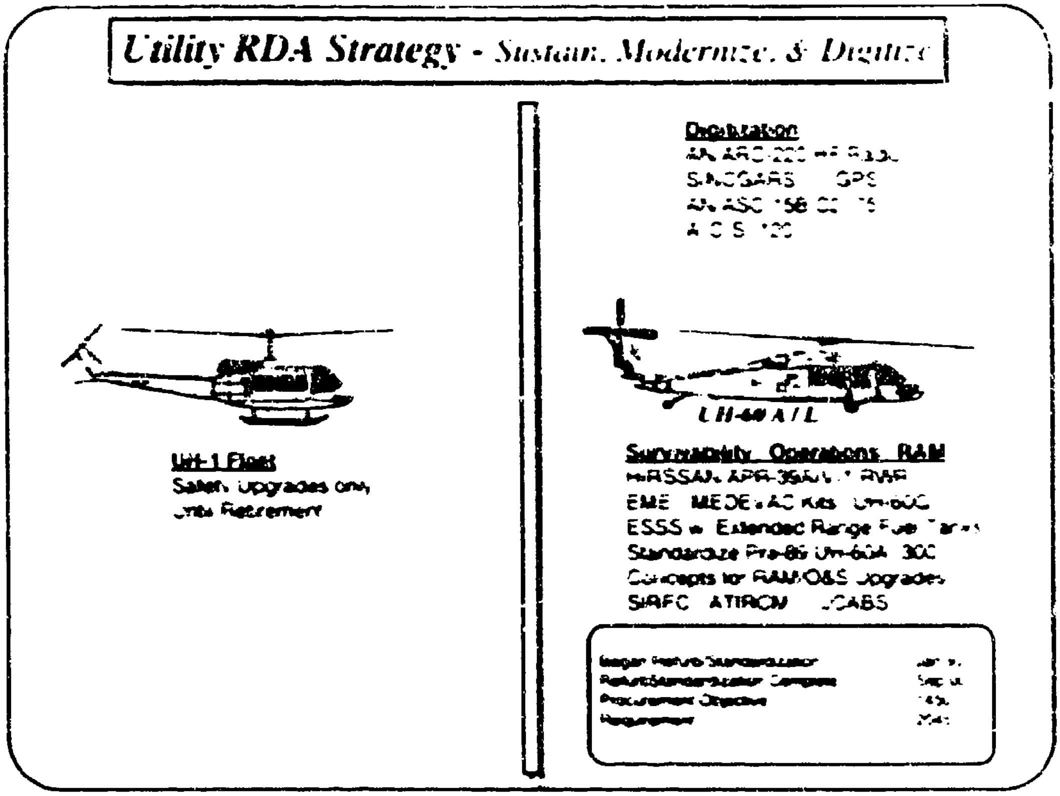


Figure O-20

MEDEVAC. The current air ambulance inventory has 124 UH-60A and 381 UH-1V. The UH-1V is old, obsolete, and maintenance intensive. An analysis is ongoing to determine the best mix of improved and affordable capabilities for a UH-60Q MEDEVAC Blackhawk. Other alternatives include retrofitting UH-60A's assigned to MEDEVAC and acquiring or modifying additional UH-60s to replace the UH-1V.

Cargo. Cargo modernization is shown in Figure O-21. Current cargo aircraft requirements are met by the CH-47D. The CH-47D modification program rebuilt all existing CH-47A B C aircraft to extend their useful life, enhance payload and range, and improve RAM characteristics. CH-47D procurement is complete with the acquisition of 444 CH-47Ds (discounting SOA). The force structure requires 485 CH-47Ds (not including SOA). Studies are underway to define CH-47D upgrade requirements. Upgrades to the CH-47D may include digitization, extended range fuel tanks, and

engine rotor components. Although the earlier CH-47D modernization program extended aircraft life by approximately 20 years, this fleet approaches the end of its programmed life in FY 02. The objective is an upgrade service life extension or replacement, depending upon out year funding. The replacement, Advanced Cargo Transport (ACT), is in early stages of concept development and is envisioned as a joint program. The National Transport Rotorcraft (NTR) program is an S&T effort focused on technologies for a potential replacement aircraft (i.e. ACT) as well as commercial transports.

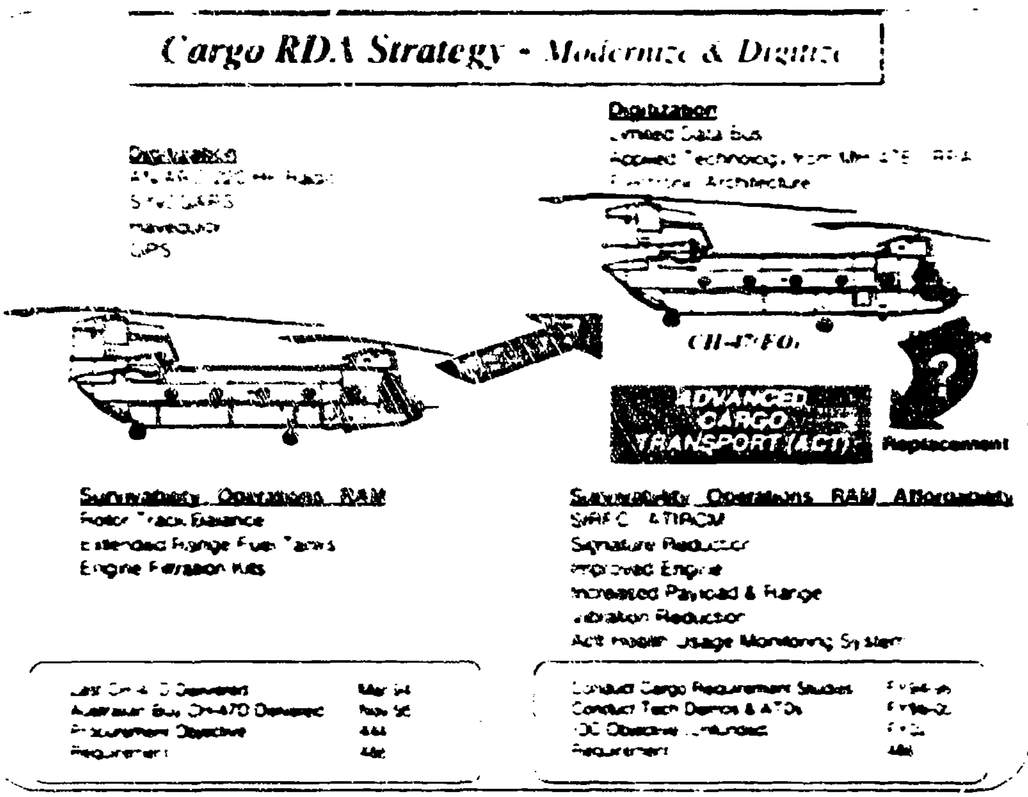


Figure O-21

Utility Fixed Wing. The utility fixed wing modernization strategy is shown at Figure O-22. The current Service Support Aircraft (SSA) fleet consists of C-20 Gulfstream and C-21 executive jet aircraft plus C-12, C-26, U-21, and A-90 turboprop aircraft. Modernization of the fleet includes an avionics upgrade to standardize C-12 cockpits and, the acquisition of C-XX Short and Medium Range (SR MR) aircraft. The C-12 avionics upgrade, to standardize C-12 communications, navigation and flight direction equipment, begins in FY 96. Upgrades include GPS, a new instrument panel, weather radar, and digitized radios, and FAA directed modifications. The POM also includes funds to upgrade C-20 avionics to provide safety, sustainment and FAA directed modifications. The C-XX (MR) is an NDI jet type commercial aircraft that supplements the C-20, C-21, and C-12 aircraft in rapidly [illegible] during initial operations. The C-XX (SR) is a proposed program and replaces the Army's U-21 and older C-12 aircraft as they reach their projected 30 year life. The current POM [illegible]

the C-XX (SR) program beyond FY 2001. The current CINC Support Aircraft (CSA) fleet consists of the C-23A/B Sherpa, C-12, U-21, and non-standard aircraft. The Multi-Mission Medium Tactical Transport (M3T2) aircraft is an unfunded, proposed common platform which performs the Aerial Common Sensor (ACS), special operations, and intra-theater utility cargo missions. Acquiring these aircraft permits reduction and standardization of the fixed wing fleet to four basic airframes. The planned future of the fixed wing fleet is detailed in the approved Fixed Wing Investment Strategy (FWIS).

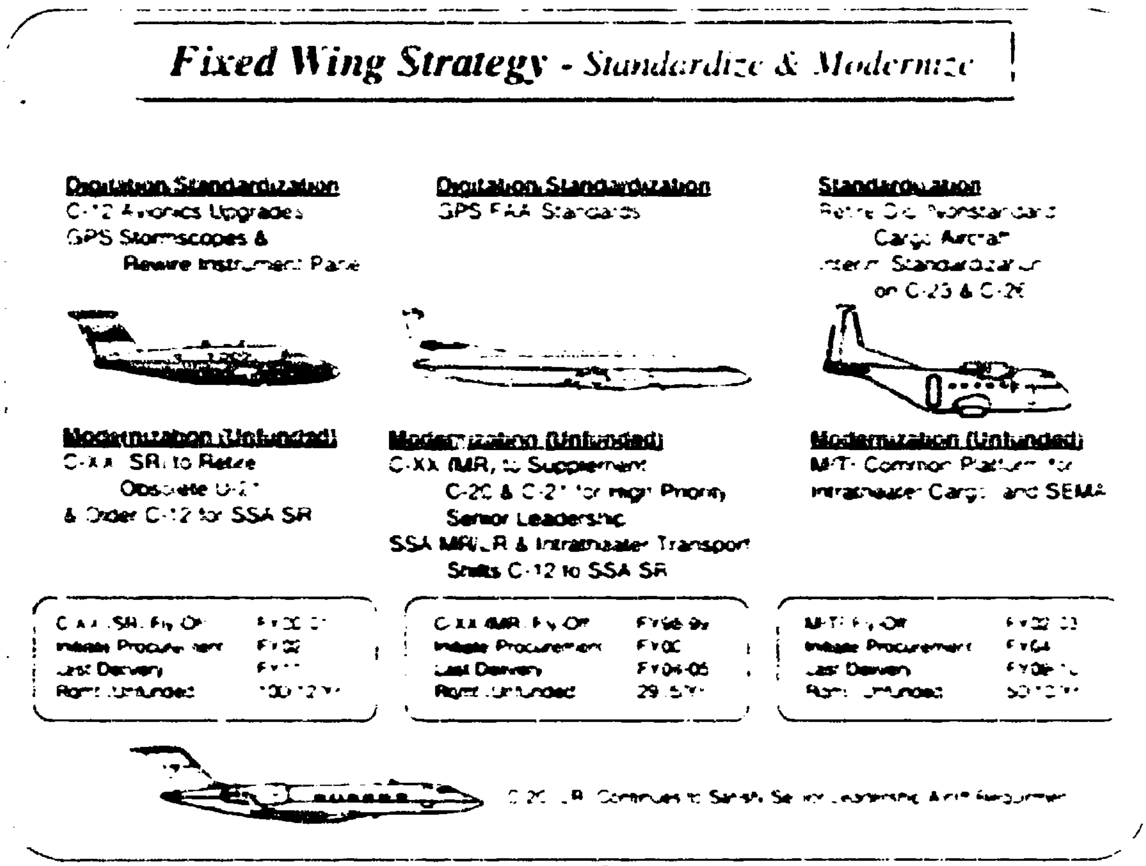


Figure O-22

Core Programs. Essential to the support and sustainment of our major aircraft programs are "core" programs which provide required mission and support equipment, as well as upgrades or new technologies that ensure the mission capabilities and operational supportability of these aircraft. The core programs include Aircraft Electronic Combat (includes Aircraft Survivability Equipment and Aviation Electronics), Aviation Ground Support Equipment (AGSE), Aviation Life Support Equipment (ALSE) and Air Traffic Services (ATS). Unfortunately, these core programs are underfunded; priority has gone to first-to-fight units. An overview of aviation core programs is shown in Figure O-23.

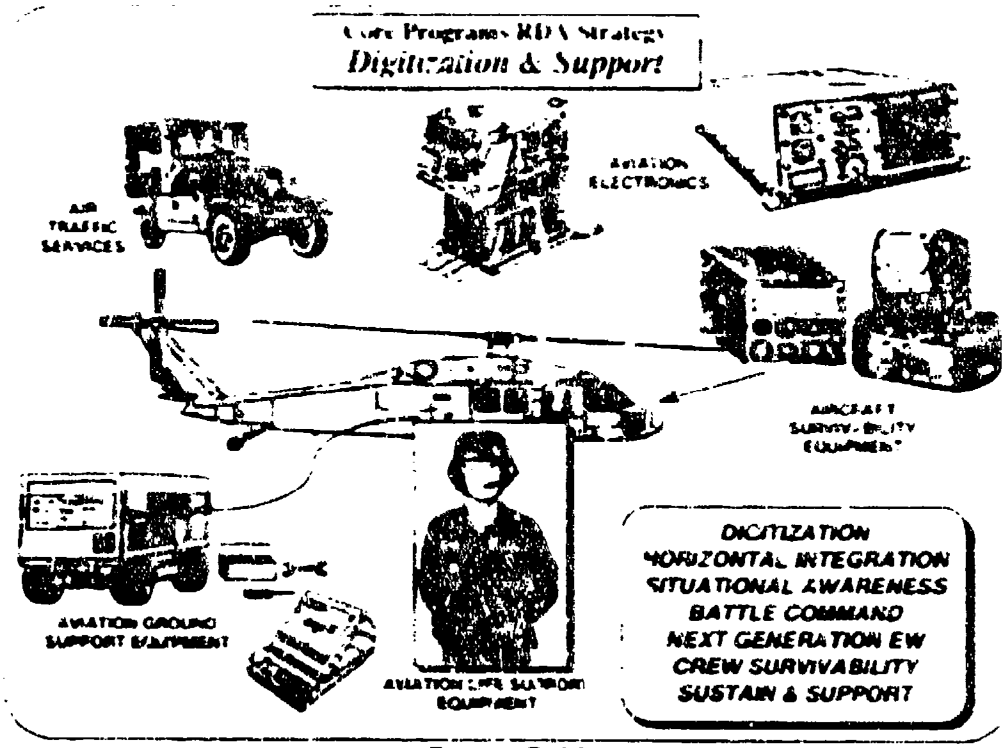


Figure O-23

Aircraft Survivability Equipment (ASE). ASE includes radio frequency (RF), infrared (IR), and electro-optical (EO) countermeasure devices. To ensure our aircraft can detect and defeat threat anti-aircraft systems, each airframe is equipped with a combination of devices appropriate to its mission and its space, weight, and power constraints. As Army aviation continues to modernize, aircraft systems must have necessary ASE items installed at the production line or via field retrofit. Ongoing and future Army and joint ASE development programs, which keep pace with advances in threat air defense capabilities, include: Advanced Threat IR Countermeasures (ATIRCM), which includes IR Jammer Head (IRJH), Advanced Threat Missile Detector (ATMD), Advanced Expendable Dispenser (AED), and Electronic Control Unit (ECU); Suite of Integrated Radar Frequency Countermeasures (SIRFC), which includes the Advanced Threat Radar Jammer (ATRJ), a high power transmitter, a Central Processor and an RF expendable decoy; Advanced RF and IR/EO expendables; Advanced EO Countermeasures (AEOCM); and passive features. Other important acquisitions include: the AN/APR-48A Radio Frequency Interferometer (RFI), AN/AVR-2A Laser Detecting Set (LDS) and, the Aircraft Survivability Equipment Trainer (ASET IV Tactical Threat Radar Simulator.

The ATIRCM and SIRFC are the two most critical ASE programs for Army Aviation EW. They provide robust situational awareness, improved target identification interfaces for digital target handover, missionized electronic order of battle, and substantially improved aircraft survivability. The fully integrated modular architectures

and digital interfaces permit application to existing and next generation aircraft (e.g., AH-64D and RAH-66). The ATIRCM replaces the current AN/ALQ-144, AN/ALQ-156, and the M-130 federated architecture IR countermeasure systems with a modular reconfigurable IR countermeasure system to defeat current and projected IR threat missiles. Initial production is planned for FY 99. The SIRFC program replaces a number of aging systems: AN/ALQ-136 pulse radar jammer, AN/ALQ-162 continuous wave radar jammer, and AN/APR-39 radar warning receiver. The SIRFC replaces federated black boxes with a lightweight RF system using an integrated, modular architecture that combines warning and jamming functions. The SIRFC provides the receiving assets, signal identification, target location, and active ECM transmissions for the integrated RF system elements. The SIRFC CPU provides sensor fusion algorithms for mission equipment and EO/IR/RF threat data correlation, threat identification, location, and assessment decision tools for coordinated multi-spectral countermeasures response, suite resource management decisions, and digital target handover interface for the combined ATIRCM/SIRFC suite. Initial production is scheduled in FY 99.

Aviation Electronics. The avionics program requires capabilities to ensure aviation meets combined arms and joint requirements for communications, navigation, information interchange, and target handover; that the avionics components are compatible, interoperable, and supportable; and, that optimum use is made of common and synergistic components. The avionics acquisition strategy maximizes the use of NDI and off-the-shelf components. Programs include: GPS; AN/ARC-220 Nap-of-the-Earth (NOE) Communications High Frequency (HF) Radio; AN/ARC-164 Havequick II radio; IDM; Army Airborne Command and Control System (A2C2S); Aviation Mission Planning Station (AMPS)/Data Transfer System (DTS); Aviation Tactical Operations Center (AVTOC); simulation; and imagery. Principal aviation digitization programs are shown in Figure O-24.

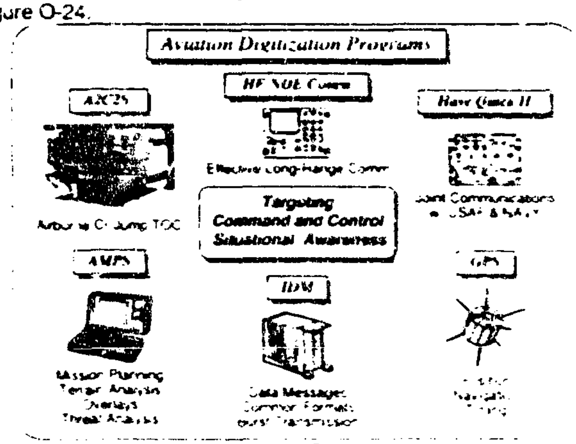


Figure O-24

Aviation Ground Support Equipment (AGSE). The AGSE program consists of RDT&E funds to develop GSE; Sets, Kits and Outfits (SKO); and cargo handling equipment, plus the necessary follow-on procurement funding for this hardware. The program maximizes the use of NDI for materiel development and acquisition. Major efforts include: the Shop Equipment-Contact Maintenance (SECM) vehicle; Advanced Boresight Equipment (ABE); the Soldier Portable On-System Repair Tool (SPORT); the Unit Level Logistics System-Aviation (ULLS-A); and the divisional and nondivisional AVIM shop set complexes. We are currently examining different programs for modularity of AVIMs. These include updating the avionics shops and installing them in transportable shelters; updating the Authorized Stockage Level (ASL) vans by using transportable containers; and updating the hand tools and equipment of the New Aircraft Tool System and Battle Damage Assessment and Repair tool systems to maintain modern and future aircraft. ARI and changes to ARI are also being examined with regard to modularity and the impact on the basis of issue of ground support equipment; sets, kits, and outfits; and materiel handling equipment. Advanced Aviation Forward Area Refueling System (AAFARS) for tactical refueling of aircraft will provide more reliable, rapid, and safer refueling capabilities. Materiel Handling Equipment (MHE) for ammo handling and for fuel handling is essential to tactical warfighting enhancements. Cargo handling equipment improvements use new technologies and concepts for cargo loading, off-loading, and transportability for potential application to the CH-47(FO), NTR, or ACT.

Aviation Life Support Equipment (ALSE). The ALSE program encompasses items of equipment needed to protect, sustain, and enhance the performance of Army aircrews and passengers, on the ground and during flight. ALSE enhances mission performance and aircrew survivability during operational missions, in crash situations, and in post crash/prior to rescue conditions. The ALSE program includes: helicopter crew restraint and air bags systems; new and P3I helmets; laser eye protection for near- and far-term IR/laser threats; NBC protection and warning systems; aircrew micro climatic cooling system; helicopter oxygen system; and survival kits (include flotation devices, survival vest, and life sustaining materiel). Another ALSE program is the Personnel Locator System (PLS), a VHF system which locates downed aviators by providing direction and distance information to the aircrewmember's PRC-112 survival radio. The Joint Service Air Warrior program, a derivative of Land Warrior, will develop unique aircrew requirements to integrate multiple ALSE technologies into a system for the aircrew, and to define aircraft integration to assure overall functional interface, enhance crew performance, and reduce unit and life cycle costs. The ALSE program envisions both joint and independent service efforts to improve ALSE.

Air Traffic Services (ATS). To support Army and worldwide commitments, ATS must be capable of supporting various types of aircraft across the entire operational continuum. As new systems and technologies are inserted in the aviation fleet, ATS concepts, doctrine, and systems must keep pace. Operational requirements for Air Traffic Control (ATC) hardware focus primarily on ATS support of Army Airspace Command and Control (A2C2). Current tactical ATS systems do not adequately support combat operations. New tactical ATS systems must be smaller, lighter, and

automated. Four tactical ATS systems are in development or concept formulation: the Tactical Terminal Control System (TTCS); Air Traffic Navigation, Integration, and Coordination System (ATNAVICS); Tactical Airspace Integration System (TAIS); and Mobile Tower System (MOTS).

Fixed base ATS supports joint, combined, and individual services training and provides equipment to support force projection deployment airfields. Likewise, modernization of the National Airspace System (NAS), fixed base ATC facilities must be upgraded in concert with the Federal Aviation Administration (FAA) so they are transparent to the user. This includes the requirement for the NAS integration.

Munitions. The HELLFIRE II and RF Longbow HELLFIRE missiles are complementary systems for the AH-64D and RAH-66, and permit precision engagements in electro-optic countermeasure environments and adverse weather. The HELLFIRE II has an enhanced laser seeker, is countermeasure hardened, and has an improved lethality warhead. The Longbow HELLFIRE missile uses the same airframe as the HELLFIRE II and incorporates a MMW seeker. Production of the improved HELLFIRE II has been terminated in FY 95 short of the inventory needed to replace the defeatable SAL-HELLFIREs. Concepts are being evaluated for an advanced, low cost, precision guided 2.75" rocket to provide a cheaper, more capable means of defeating non-armored targets. Improvements to the Air-to-Air Stinger (ATAS), via a reprogrammable processor and improved seeker, are continuing. The Army's Combined Arms Weapons System (TACAWS) is an Advanced Technology Demonstrator (ATD) effort to develop a common combined arms missile to replace TOW and Stinger.

Horizontal Technology Integration. Army aviation is developing advanced capabilities which can provide solutions to required battlefield capabilities for other members of the combined arms team; specifically: Comanche computer processors, Enhanced Communication Interface Terminal (ECIT), A2C2S, AMPS, Comanche 2nd Generation FLIR, RPA's Cognitive Decision Aiding (CDA) system, ANVIS Heads-Up Display (ANVIS-HUD), turbine engine technologies, and maintenance prognostics/diagnostics. Additionally, the joint Integrated Communications, Navigation, and Identification Avionics (ICNIA) program has tremendous HTI potential for other than aviation applications.

Aviation Science and Technology Program. The aviation S&T program provides the underpinning for technology, and aircraft/avionics integration programs. It also develops the foundation for aviation's system upgrades and next generation/future systems capabilities to meet changing threats, mission requirements, and to support the modernization strategy. In addition, through the tri-service Project Reliance and Joint Aeronautical Commanders Group (JACG), the aviation S&T program is the DoD lead and focus for rotorcraft technologies. The S&T strategy for aviation is detailed in the Army Science and Technology Master Plan (ASTMP). The aviation S&T strategy (Figure O-25) shows the interrelationship between aviation disciplines, Technology Demonstrations (TD), and Advanced Technology Demonstrations (ATD). The Aviation

S&T program addresses aeromechanics, flight controls, structures, drive trains and propulsion, subsystems, weapons integration, aircrew-aircraft integration and man-machine crew integration, survivability/vulnerability/safety, and advanced concepts for DoD rotorcraft. It addresses these via application of DoD/NASA/academic resources, simulation, virtual prototyping and integrated Product and Process Development (IPPD). These approaches reduce risk, minimize costs, and enhance multi-service and dual use applications derived from the aviation S&T program.

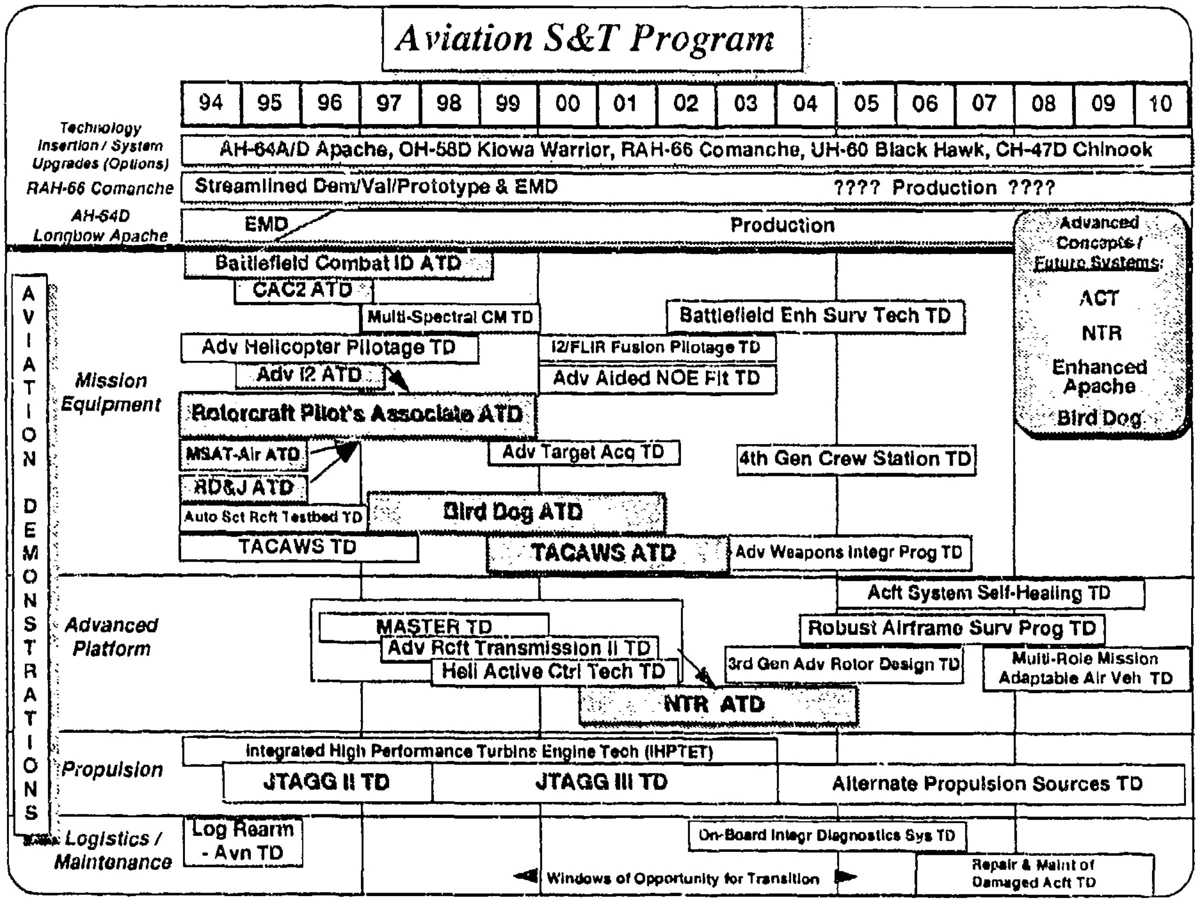


Figure O-25

Aviation Demonstrations. The key ATDs are Rotorcraft Pilot's Associate (RPA), Multi-sensor Aided Targeting-Airborne (MSAT-Air), and Radar Deception and Jamming (RD&J). Current TDs that are candidate ATDs include: Bird Dog, National Transport Rotorcraft (NTR), and The Army's Combined Arms Weapon System (TACAWS). The technology demonstrations in support of NTR address airframes, structures, rotors, and transmissions. Key TDs are: Joint Turbine Advanced Gas Generator (JTAGG), Manufacturing and Structures Technology for Efficient Rotorcraft (MASTER), Helicopter Active Control Technology (HACT), Advanced Rotorcraft Transmission (ART), Autonomous Scout Rotorcraft Testbed (ASRT), Advanced Helicopter Pilotage (AHP), and Logistics Rearm for Aviation.

The RPA ATD develops and demonstrates revolutionary improvements in combat helicopter mission effectiveness through the application of Artificial Intelligence (AI) for Cognitive Decision Aiding (CDA), plus integration of advanced pilotage, target acquisition, armament and fire control, communications, controls and displays, navigation, sensors, survivability, and flight control technologies. The RPA real time cognitive decision and task aiding system includes route planning, data fusion of onboard and offboard intelligence and targeting sources, targeting and weapons manager, internal and external situation assessment, communication planner, and a cockpit information manager. The RPA ATD uses technologies developed in the RD&J, MSAT-Air, AHP, Day/Night Adverse Weather Pilotage System (D/NAPS), and Target Data Acquisition and Correlation (TDAC) efforts. The RPA technology is targeted for use in the AH-64 Longbow Apache, RAH-66 Comanche, and Special Operations Aircraft.

The Bird Dog TD concept, considered a candidate ATD, uses an aircraft team of a manned helicopter and an unmanned air vehicle (UAV) to perform Army aviation missions. The UAV is capable of semiautonomous operation. With state of the art sensors, it detects and identifies targets, reports locations, and sends real time video to the air crew and ground stations; it thus extends aircrew situational awareness, enhances stand-off engagement capabilities, and improves survivability. Bird Dog capitalizes on the ASRT program, artificial intelligence, fuzzy logic and advanced computing (for semiautonomous flight, mission execution, and sensor operation), and on obstacle detection/avoidance (for autonomous NOE flight). The RPA program provides technology essential to develop the optimum trade-off between UAV autonomy and pilot/operator control workload needed to make the two aircraft operate as a complementary team.

The NTR TD, also considered a candidate ATD, supports future Army aviation systems requirements and, in an environment of declining resources, the dual use S&T effort for both military and civilian applications. The NTR is envisioned as a rotorcraft with the potential to meet military cargo (i.e., ACT)/troop transport needs, as well, the high volume, short-haul commercial commuter aviation market. The objectives of the NTR ATD are to identify advanced technologies and manufacturing methods which can reduce the time and cost to develop, acquire, and own future aircraft. The greatest dual use potential for technology application to a cargo/commuter rotorcraft are: lightweight, reliable transmission; advanced flight controls; highly efficient rotor; smart structures, to include materials and manufacturing; and simulation and virtual prototyping. The ART, HACT, and MASTER programs support this demonstration.

The TACAWS ATA/ATG TD, considered a candidate ATD for FY 99-02, demonstrates the integration on a rotorcraft of a lightweight, fire-and-forget, multirole missile system for air to air and air to round engagements. The missile system includes the integration of common guidance and control, propulsion, airframe, and warhead technologies capable of performing in high clutter/obscurants, day/night adverse weather environments, and in countermeasure conditions (as is being demonstrated on the ground-based TACAWS TD). Missile system performance must exceed current

baseline systems. TACAWS is envisioned to replace TOW, Stinger, Air-to-Air Stinger (ATAS), and similar systems.

MSAT Air ATD demonstrates automatic target acquisition, recognition, tracking, and hand-over in operational environments. A prototype second generation FLIR and proof of principle Longbow Fire Control Radar (FCR) are integrated into a UH-60 test bed helicopter. Multisensor fusion provides a viable technical solution to robust Aided Target Recognition (ATR). Comanche incorporates a FLIR/MMW multisensor suite. MSAT-Air is being coordinated with PEO Aviation and the Army Aviation Center to facilitate the transition of the multisensor fusion capability to the Comanche development effort and as a potential upgrade to Longbow Apache.

The Advanced Image Intensification (I2) ATD demonstrates the next generation night vision goggle to enhance operational effectiveness/safety and reduce pilot workload. The Advanced I2 ATD will exploit technology advances in display and intensifier technologies, image intensification, optics, and human factors research.

The RD&J ATD demonstrates sensor fusion and power management of ASE, electronic support measures, and other avionics for situation awareness, survivability, targeting, and IFF assist. Improvements include increases in threat coverage, accuracy, and jamming. New capabilities include friendly emitter identification/ correlation, reprogrammability of user/threat data module during mission planning, and inflight threat updates via realtime C3I data link. This program supports RPA, advanced RF countermeasures, RAH-66, and AH-64 improvements.

The Joint Turbine Advanced Gas Generator (JTAGG) is a tri-service effort compatible with the goals of the Integrated High Performance Turbine Engine Technology (IHPTET) initiative. JTAGG II and III address IHPTET performance goals for FY 97 and FY 03. A full engine demonstration of the improvements in gas turbine technology, resulting from the JTAGG program, are to be conducted, as required, so as to be compatible with system, system upgrade, and advanced concept requirements. JTAGG seeks to demonstrate improvements in performance, efficiency, and power-to-weight ratio over current production engines. The effort supports engine upgrades or replacements for all rotorcraft, including ACT/NTR, AH-64 improvements, and dual use/commercial applications.

Battle Laboratory Initiatives. Aviation participation in battle laboratory experiments and demonstrations focuses on the Force XXI objectives and improving our ability to command and control, acquire targets, collect and disseminate battlefield information, and plan missions with increased flexibility. An Aviation Campaign Plan was developed to define the aviation capabilities required to achieve these Force XXI goals, and what advanced warfighting experiments and advanced technology demonstrations can best be used to examine these capabilities. Near-term battle laboratory participation centers on digitization of the battlefield, early entry force design, and Theater Missile Defense (TMD). Aviation will participate in numerous AWEs and ATDs in 1995 to include AWE Strong Safety and AWE Theater Missile Defense

sponsored by the Depth and Simultaneous Attack Battle Lab, AWE Focused Dispatch sponsored by the Mounted Battle Lab, and AWE Warrior Focus sponsored by the Dismounted Battle Lab. Aviation will also participate in Joint Precision Strike Demonstrations, Mobile Strike Force, Anti-Armor ATD, and Prairie Warrior exercises. Mid and far-term experiments emphasize organizational redesign and integration of information age technology into brigade through Corps. Aviation will integrate near-term and follow-on concepts into these AWEs/ATDs to create a more agile, versatile, and lethal aviation force.

Conclusion. The impact of resource limitations on aviation's aircraft modernization strategy is illustrated in Figure O-26. The void in production lines are disconcerting. The difference between the requirement and the procurement objective for the RAH-66 will be absorbed in the float resourcing requirement, after Comanche procurement decision is attained. For the UH-60, the shortfall between the requirement and the procurement objective results in the indefinite retention of over 900 UH-1's. The resourcing of aviation at the current POM levels stretch modernization well beyond 2015 and delays retirement of the last OH-58D until at least 2023.

Procurement Objectives
President's Budget / FY96-01 POM

Airframe	Fiscal Year 95	96	97	98	99	00	01	Total Thru POM	Procurement Objective
AH-64A								821	821
AH-64D		18	26	37	48	53	52	234 →	758
OH-58D	17							383	383
RAH-66						~~3~~	~~8~~	~~11~~ 0* →	~~1292~~ TBD
UH-60	60	60						1390	1390
CH-47D								444	444
Cost ($B) (Aviation TOA)	1.9	1.7	1.5	1.5	1.8	2.0	2.1	* No Production-Prototypes only	

UH-60A Does Not Include 66 EH-60s, 60 SOA (MH-60)
UH-60 Total Includes 93 Unavailable Aircraft (48 Attrited, 16 USAF, 18 Customs, & 10 Security Asst Pgm Xfers)
CH-47D Does Not Include SOA (26 MH-47E, 11 MH-47D)
AH-64D figures are upgrades to existing AH-64A airframes; no new buys

Figure O-26

SECTION 5

TRAINING

TRAINING STRATEGY

Contingency, joint, combined arms forces fighting on battlefields worldwide, taxing traditional lines of communication, command, and control will be the norm for aviation units as a part of Force XXI. Rapid increases in weapon system technology will provide capabilities to fight, survive, and win; but only if soldiers are trained to meet the challenges of employing highly complex weaponry, in a wide range of missions and operational environments. Focused training to prepare aviation soldiers to fight effectively in joint, combined arms environments will be an integral piece of the Army's overall warfighting training strategy for Force XXI. The aviation Combined Arms Training Strategy (CATS) will be updated to reflect these changes, thus ensuring a synchronized training program to support aviation's modernization efforts. Future simulation and training devices will have a significant impact on ensuring a trained and ready force during a period of increased resource constraints.

Training and Leader Development. The training and leader development strategy for aviation is represented by Figure O-27.

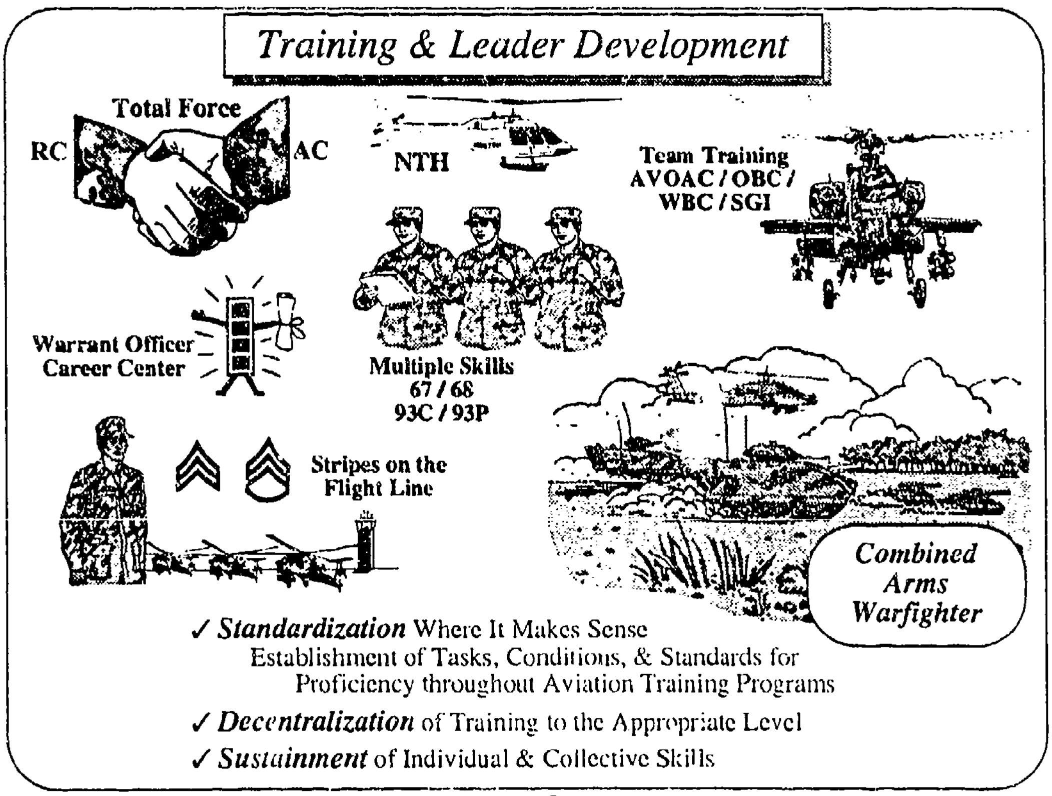


Figure O-27

This strategy continues to emphasize individual, crew, and collective training and it includes initiatives to develop combined arms warfighters. Increasing exchanges of officer advanced course students among the Aviation Center and other combined arms schools continues. The Warrant Officer Advanced Course has significantly changed to emphasize warfighting knowledge and skills; warrant officers also attend courses to prepare them for battalion or brigade staff positions. The Noncommissioned Officer Education System remains the foundation of NCO training.

A new training helicopter, the TH-67 Creek, has reduced operating and support costs for the 20 week core Initial Entry Rotary Wing (IERW) training program without degrading training effectiveness. This is being accomplished by displacing 179 UH-1s with TH-67s (requirement 157).

Personnel proponency initiatives include assigning highly skilled, noncommissioned officers to conduct maintenance at the unit level and the consolidation of military occupational specialties to provide multiskilled soldiers.

TRAINING AIDS, DEVICES, SIMULATORS, AND SIMULATIONS (TADSS)

TADSS Strategy. The aviation branch has recently completed a capstone TADSS strategy which summarizes all aviation distributed interactive simulation requirements. It supports the three domains of research, development, and acquisition; advanced concepts exploration; and training The full spectrum of constructive, virtual, and live simulation requirements are included. Applications for the simulation environment include:

- Full mission soldier-in-the-loop simulations to define technology needs and automation requirements as well as assess soldier performance and time lines.

- Closed simulations to evaluate requirements and conduct tradeoff analysis of survivability, mission capability, and cost effectiveness.

- Crew station simulators designed to optimize man-machine interface, control laws, fire control, controls and displays logic, and symbology and display presentation.

- System level interactive simulations to integrate mission equipment package and armament systems, develop integrated training system design, conduct technical test and evaluations, augment flight tests, and conduct system validation.

Aviation Combined Arms Tactical Trainer (AVCATT).

The Aviation CATS reflects the requirement to train and sustain the individual, crew, collective, and combined arms skills necessary to fight and survive on the combined arms battlefield. Current training media and the environments in which they are employed, do not provide the realism, intensity, and integration required to ensure effective training of these skills. Existing simulation is limited primarily to individual/crew trainers, and field training exercises are increasingly constrained by high costs, environmental and safety restrictions, limited maneuver areas and ranges, and inadequate threat/target representations.

To ensure Aviation CATS and Force XXI training is achievable, aviator training simulation requirements have been consolidated in AVCATT. Through consolidation both cost and training effectiveness are achieved. Training effectiveness is achieved through: (1) standardized training across the combined arms team for all levels of training, individual/crew through joint task force/combined arms, for all active and reserve component attack, reconnaissance, assault, and lift units worldwide; (2) the capability to train to fight using scenario based training and focusing on mission accomplishment and tactical decision making in realistic combat environments; and (3) the capability for unit commanders, staff, and aircrews to train together to fight together. Cost effectiveness is achieved through: (1) reconfigurable manned simulators and software architectures; (2) the consolidation of development, procurement, and life cycle support costs in one system versus multiple systems; (3) maximum leveraging of on-going, funded programs such as the Apache Crew Trainer (ACT), Apache Crew Trainer System (ACTS), Longbow Crew Trainer (LCT), Longbow Crew Trainer System (LCTS), Aviation Digitization Lab (ADL), Aviation Warfighting Cell (AWC), Battle Lab Reconfigurable Simulator Initiative (BLRSI), and Close Combat Tactical Trainer (CCTT); and (4) conduct of functionality, fidelity, task, domain, interoperability, virtual battlefield, scenario based training, command and control analysis in the Aviation Test Bed (AVTB) to reduce AVCATT cost, schedule, and risk.

AVCATT components are:

- Reconfigurable manned simulators replicating the AH-64A Apache and AH-64D Longbow Apache, (utilizing to the maximum extent possible existing ACTS and LCTS,) RAH-66 Comanche, OH-58D Kiowa Warrior, UH-60 Blackhawk, and CH-47D Chinook aircraft.

- A simulated tactical battlefield, to include friendly and opposing semiautomated forces, environmental conditions, and realistic emulation of communication, navigation, weapons, aircraft survivability equipment, and sensor systems.

- Command and control capabilities to include the Aviation Tactical Operations Center (AVTOC), Army Airborne Command and Control System (A2C2S),

Aviation Mission Planning System (AMPS), and an Army Airspace Command and Control (A2C2) cell.

- An After Action Review (AAR) capability for real time viewing and after action debriefing and rapid turnaround; and,

- Training control systems to include a training management system to develop exercise parameters, instructor operator stations to support individual and crew training, and a master control console to support collective and combined arms training.

Aviation Test Bed (AVTB). The AVTB is a Distributed Interactive Simulation (DIS) site which provides the aviation node for Advanced Warfighting Experimentation (AWE), Advanced Technology Demonstrations (ATD), and other Battle Lab exercises. In order to meet the evolving requirement of defining aviation's role on the Force XXI battlefield, the AVTB is being upgraded with a digitization capability. That upgrade, the Aviation Digitization Lab (ADL), provides the capability to play an aviation force on the 21st Century digitized battlefield.

The ADL integrates existing simulations to provide a corps/division size, constructive/virtual, electronic battlefield capable of real time interface with battlefield sensors, Command and Control (C2) nodes, and advanced aircraft manned simulators. The foregoing will operate within the AVTB on a DIS Local Area Network (LAN), upgraded to accommodate digital communication, and be capable of participating in networked exercises via Distributed Interactive Simulation (DIS).

The EAGLE constructive simulation is the baseline, providing an approximate 300K x 300K corps battlefield with aggregated blue/red Computer Generated Forces (CGF). Other simulations interface with EAGLE. The Extended Air Defense Simulation Module (EADSIM) brings ADA systems into play. The Interactive Tactical Engagement Management System (ITEMS) and MODSAF will be interfaced with EAGLE/EADSIM to provide the blue and red semiautomated forces (SAFOR). Emulations of battlefield sensors to include Joint Surveillance Target Attack Radar System (JSTARS), Unmanned Aerial Vehicle (UAV), and satellite broadcast intelligence provide battlefield intelligence to command and control nodes to include simulations of an Aviation Tactical Operations Center (AVTOC), an Army Airborne Command and Control System (A2C2S), an Aviation Mission Planning System (AMPS), and generic ground Tactical Operations Center (TOC). Virtual battlefield entities represented by manned cockpit simulations to include Apache, Comanche, Longbow, and Kiowa Warrior and the SAFORs will interact with the EAGLE CGF on a real time basis.

Establishment of the ADL will be an integration effort involving multiple government-owned models, simulations, and simulators onto Computer-off-the-Shelf (COTS) hardware. Several government and industry agencies will be involved in the total effort. The ADL integrator will be responsible for developing systems engineering plans, software interface documentation, and site design architecture to ensure interoperability and facilitate documentation for verification/validation efforts.

Maintenance Training Devices. Part task trainers and composite maintenance trainers are being developed and fielded to support individual qualification and sustainment training for the AH-64A, OH-58D, UH-60, AH-64D and RAH-66. These will supplement trainers for aircraft in the current inventory, will assist in returning airframes being used for maintenance training (Category B) back into the flyable fleet, and will capitalize on the use of technology and Computer Based Instruction (CBI) to enhance training.

Concurrency. Training device concurrency with weapon systems is essential if positive training transfer of skills and knowledge is to occur. All weapon system changes are to be reviewed for their impact on training devices; upgrades will be implemented as necessary to maintain training device concurrency.

Multiple Integrated Laser Engagement System (MILES) Air Ground Engagement System (AGES) II and Tactical Engagement Simulation System (TESS). Aviation training at the Combat Training Centers (CTC) is imperative to ensure that all commanders are proficient in including aviation forces in the combined arms fight. There are currently plans to field MILES/AGES training devices at the CTCs and in Korea. In addition there is an unfunded requirement for adequate numbers of these systems to accomplish home station training requirements. Longbow and Comanche advanced weapons simulators are also being developed.

- **Gunnery.** Significant gunnery improvements continue to be made in helicopter gunnery training. Simulators are being improved to encompass the fundamentals of helicopter gunnery: proper predeployment checks; proper switchology; maintaining stabilized weapon platforms; proper sensor sighting tracking; engagement techniques; and situational awareness. A training matrix is being formulated for the simulators that trains simple to complex gunnery task levels, evaluates, and provides skill level information to the commander. It will be user changeable and will develop a skill level that is transferable from the simulator to the aircraft. Matrix standards are based on draft FM1-140, Helicopter Gunnery, using the same engagements as in the gunnery tables. The gunnery training matrix that is being developed for the Apache Combat Mission Simulator (CMS), ACT, and LCT, will be incorporated into new Combined Arms Trainers (CAT) simulators, such as the AVCATT. Emerging technology is being developed that will allow gunnery training to be conducted in the Joint Combined Arms Training Arena by using such things as RF signals, onboard algorithms, and "smart targets" to interact with aircraft systems. The future of this technology may lead to full interactive gunnery training that requires live fire only to validate systems operation.

Aircraft Survivability Equipment (ASE) Training. ASE and electronic warfare training, doctrine, and simulation are undergoing major restructuring. All aviators and avionics NCOs are to be trained in the two Ft. Rucker ASE learning labs with common ASE hardware training aids. The new ASE/Electronic Warfare officer is trained to be

the subject matter expert in aviation units. ASE/EW is integrating into the BDS-D constructive simulation and man-in-the-loop virtual simulation with the distributed interactive simulation from the AVTB. These simulations allow hardware and man-in-the-loop testing of doctrine, tactics, techniques, and procedures, plus the development of ASE systems. Unit training continues to be supported by the Aircraft Survivability Equipment Trainer (ASET) II desktop. ASET III provides in flight ASE and electronic warfare training while in flight. ASET IV will provide collective force-on-force EW training. A prototype has been fielded and tested at the National Training Center. Production models will be fielded at each of the Combat Training Centers.

Air Traffic Control (ATC) Training. The digital Automa Tower Simulator (DATS) has been fielded at the U.S. Army Aviation Center (USAAVNC) to train Military Occupational Specialty (MOS) 93C personnel and control tower operations. Engineering Change Proposals (ECPs) are being developed to upgrade pseudo pilot position to automatic voice recognition, provide a "god's eye" view of computer generated targets within a 50 mile radius and improve the controller/instructor communications station.

A Mission Needs Statement for a radar ATC simulation device (desk top) has been developed and is in the coordination/approval phase. Procurement is for an estimated 30 systems for USAAVNC with additional units to support the field.

CONCLUSION

Advances in technology, networking, and software increase effective joint/combined arms training with appropriate TADSS. This training strategy leverages these technologies and enhancements to offset decreases in training resources and make combined arms training possible in the simulator.

This training section has covered areas specific to Aviation. For further information on Army-wide training initiatives and issues, or for a detailed explanation of fielding and funding status, consult Annex R, Training, of this document.

SECTION 6

CONCLUSION

The future of Army aviation has been mapped out along a path to achieve Force XXI. This plan is a prudent, proactive course of continuous improvement.

Figure O-28 summarizes FY 96-01 aviation program resourcing under the FY 96-01 Program Objective Memorandum (POM). Fiscal shortfalls over the POM place the aviation modernization program at risk in a number of areas. A number of critical aviation programs are unfunded. The UH-60 multiyear procurement program was stopped after 1996, leaving a shortfall of over 700 UH-60s to fill a four corps, 18 division requirement. Aviation digitization programs are, for the most part, only funded for units of our contingency forces. This creates potential incompatibility within the aviation fleet. There are no procurement dollars to support CH-47D upgrades or replacement platforms; moreover, these airframes will begin approaching 40 years of age at the turn of the century. A replacement aircraft, the Advanced Cargo Transport, is not envisioned until FY 2020. The Army is addressing these problems through funding requests in FY 97-02 and subsequent POMs for continued UH-60 procurement and to begin CH-47D follow-on efforts. Both the RAH-66 and AH-64D receive funding in the

POM FY96-01

DOES:

RAH-66	• RDT&E Streamlined Funding • Build Prototypes
AH-64D	• Ramps to 52 from a 72/yr plan • Procures LB Hellfire Missile • Funds TESS
AH-64A	• RAM and ODS Fixes • Funds TADS/PNVS/CATB
FW, CH-47	• Provides Min Safety of Flt Mods
CORE	• Most of ATC, ALSE, ASE, AGSE • Digitizes most of Contingency Force
UH-60	• Min Mod Funds Incl Most of Refurb Program
OH-58D	• Mods/CSMET

DOES *NOT:*

RAH-66	• Initiate Comanche Production
UH-60	• Continue Procurement after FY96
CH-47(FO)	• Fund for CH-47D Follow-On
Hellfire	• Procure Hellfire II for Total Rqmt
OH-58A/C	• Provide Min Safety of Flt Mods
AH-1	• Provide Min Safety of Flt Mods
UH-1	• Provide Min Safety of Flt Mods
NTH	• Procure 20 Aircraft Shortfall
UH-60Q	• Modify any UH-60A
AVCATT	• No Funding until FY01
Fixed Wing	• Buy C-XX or M3T2

Figure O-28

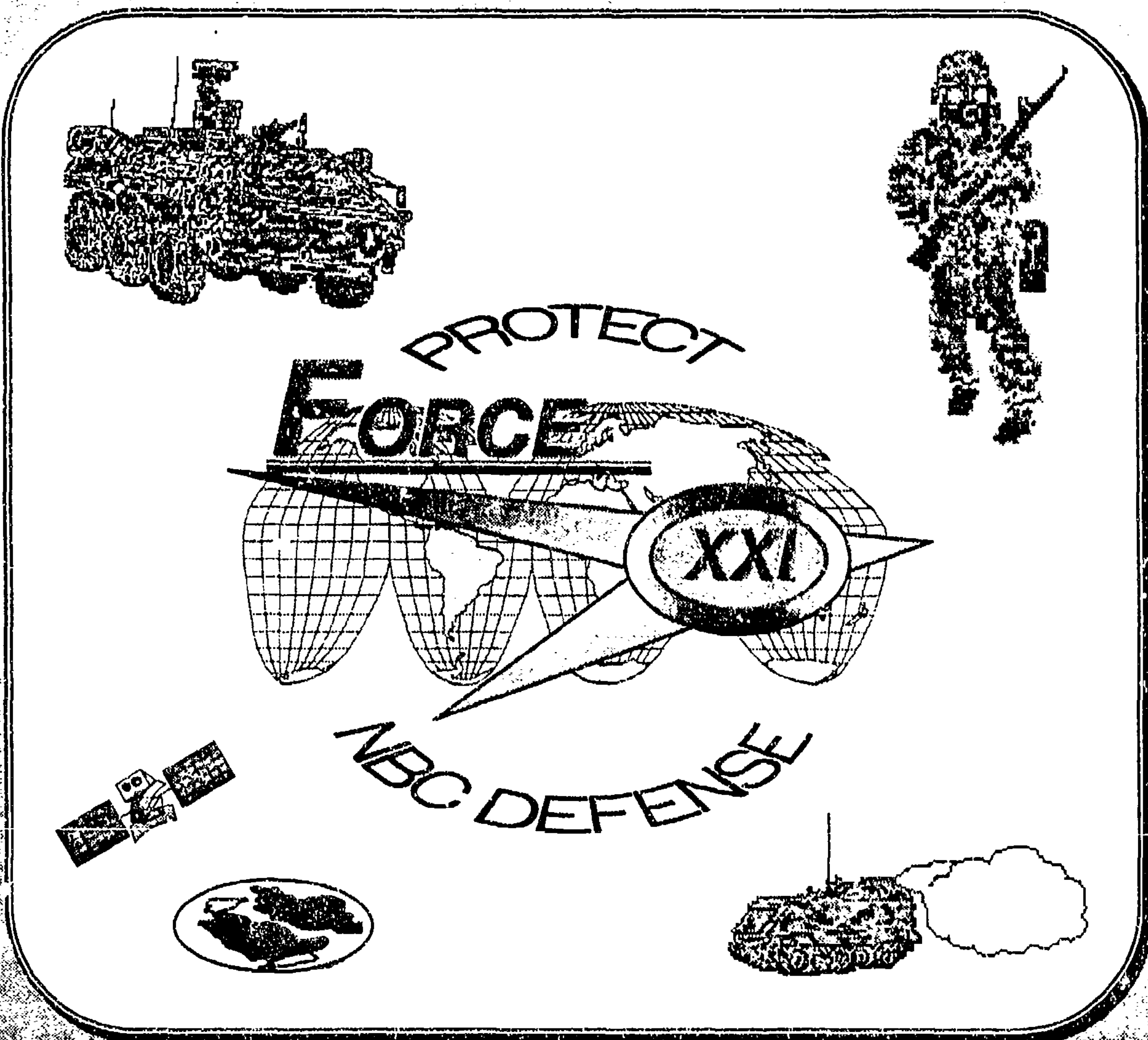
POM, however, PDM IV reduces the Comanche program to only two flyable prototypes and defers production. Continued Congressional and OSD support for both of these programs is critical. In the fixed wing arena, the POM provides no funding for C-XX or M3T2, and severely under funds the C-12 avionics upgrade. Our number one S&T program, the Rotorcraft Pilot's Associate ATD, has been stretched out to FY 99 due to significant cuts in FY 94. There is no funding to procure 20 New Training Helicopters in FY 96 to alleviate the shortfall from our 157 aircraft requirement. Continued funding for next generation EW systems (SIRFC and ATIRCM), digitization, and other core programs is essential to realize aviation situational awareness, tactical flexibility, combat support, and sustainment.

Army aviation today supports soldiers worldwide. Army aviation is organized to optimize its unique capabilities, both in Operations Other Than War (OOTW) and in combat. Whether conducting tactical reconnaissance, security operations, force protection, attack helicopter operations, air assaults, combat support, or combat service support operations, aviation enhances the efficiency and effectiveness of all battlefield operating systems while bringing its own unique capabilities to the fight--capabilities that complement those of other arms and services. While the possibility of a major conflict exists, crises short of such conflict are more probable. These require response by rapidly assembled and projected forces, to locations throughout the world, on a moments notice. Just Cause, Desert Storm, Restore Hope, and Uphold Democracy are recent examples. Aviation is uniquely suited to meet such challenges; however, sufficient funding of key aviation programs is necessary to ensure the continued essential warfighting capabilities of this highly versatile force.

The Aviation Modernization Plan (AMP) is a resource constrained strategy which addresses the significant shortfalls in reconnaissance/security; provides attack helicopter fixes; makes major strides in digitizing the force; and sustains our utility, cargo, and fixed wing fleets. It emphasizes the necessity of fully fielding both Comanche and Longbow Apache because they give the Army the highest payoff in warfighting capabilities. Without these systems, the cost to our nation could be much higher, both monetarily and in risk to lives. Given adequate resourcing, the AMP ensures aviation will continue to provide support across the range of military operations while significantly contributing to the Army's modernization goals and the attainment of its Force XXI objectives.

ANNEX P

NUCLEAR, BIOLOGICAL AND CHEMICAL



ANNEX P

NUCLEAR, BIOLOGICAL AND CHEMICAL

"The use of weapons of mass destruction can have an enormous impact on the conduct of all operations. Not only do the sheer killing and destructive power of these weapons create the battlefield effect, but the strategic, operational, psychological, and political impacts of their use affect campaign planning...Force protection is an imperative in this environment."

FM 100-5, Operations, June 1993

SECTION 1

INTRODUCTION

The National Defense Authorization Act for FY 94, (Public Law No.103-160, Title XVII, Chemical and Biological Weapons Defense, section 1703) designates the Secretary of the Army the "executive agent for the Department of Defense to coordinate and integrate research, development, test, and evaluation, and acquisition, requirements of the military departments for chemical and biological warfare defense programs of the Department of Defense." To implement this executive agent function, the Army, in concert with the other military departments, has developed a joint management process. The purpose of the process is to consolidate the myriad individual service requirements and development efforts into a true joint program of common requirements, research, and development efforts. This guiding principle is the underpinning of the emerging **Joint NBC Modernization Plan.** Its scope and structure are similar to this annex.

To achieve these goals requires a focused long-range strategy to correct existing deficiencies, enhance existing capabilities, and to leverage technological opportunities to provide new NBC materiel solutions.

As the Army moves toward the 21st Century, it faces continuing proliferation of Weapons of Mass Destruction (WMD)--Nuclear, Biological, and Chemical (NBC) weapons, uncertain threats, and constrained resources. To counter that threat effectively and use limited resources wisely, the Army's Nuclear, Biological and Chemical (NBC) capabilities must retain their modern character--offer our forces "world class" force protection--at the best possible price (Figure P-1).

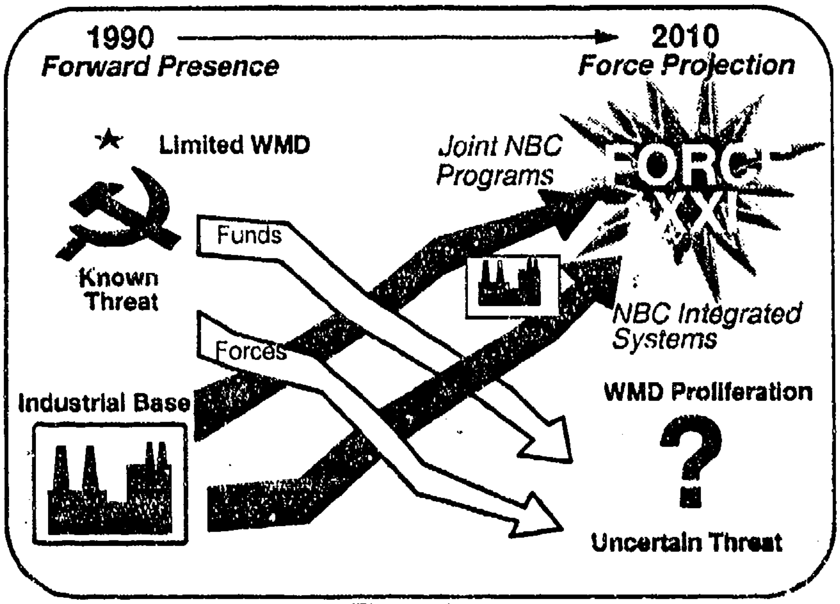


Figure P-1

The NBC mission area faces its own set of environmental constraints as it plans the modernization of the 21st Century Army (Figure P-2).

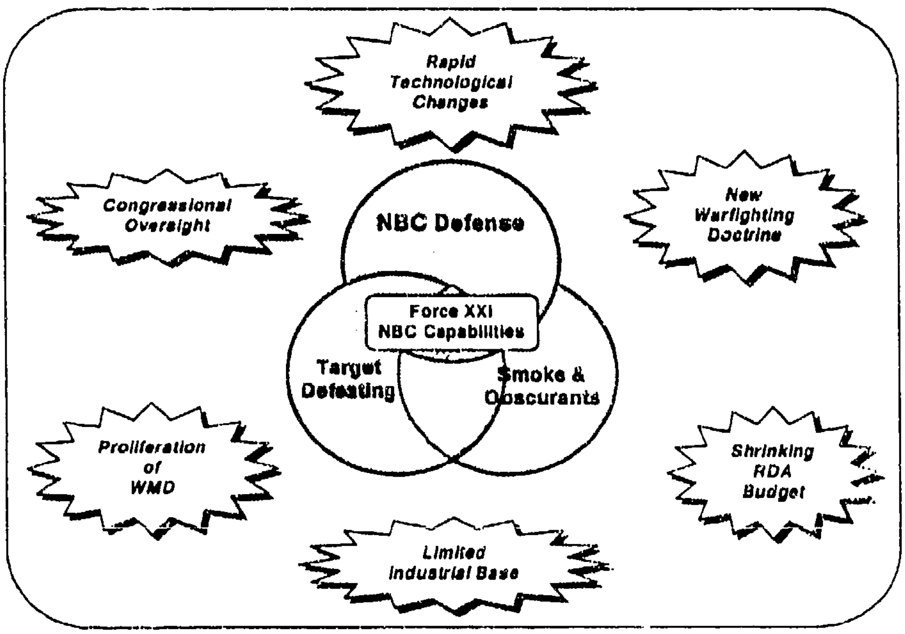


Figure P-2

T :rmy's NBC modernization strategy has a single aim—to ensure Army forces can o .e effectively, anywhere in the world, in chemical, biological or ra ..iological contaminated environments. This aim derives from the U.S. National Military Strategy. It depicts the strategic environment replete with WMD, and calls for strengthening our

defenses against such weapons. This aim also derives from the Army modernization strategy which embraces Force Protection as one of its major objectives.

The proliferation of WMD around the world, and the likelihood Army forces will be called upon, perhaps frequently, to deploy to any number of areas to counter a variety of threats worldwide, poses unique challenges. These challenges include the necessity to improve force survivability, strengthen our operational capabilities to detect and identify NBC hazards, protect the force against those hazards, and effectively decontaminate when necessary. The major goals of the Army's NBC modernization programs are intended to meet these challenges today and into the foreseeable future.

Future Army -- Force XXI -- will "face a different world threat - not of overwhelming global nuclear war - but of states, or even criminal groups, with inventories of chemical, biological or nuclear weapons and fewer inhibitions about using them." (TRADOC Pamphlet 525-5, *Force XXI Operations*, Aug 94). Force XXI requires increased versatility, lethality, deployability, sustainability, and improved interoperability with the other Services and coalition partners; these compel both evolutionary and revolutionary advances in NBC modernization. For example, developments in digitization and satellite technologies offer opportunities that allow near instantaneous warning of specific NBC hazards to our troops, provide commanders more options to select appropriate levels of force protection, and increase the survivability of our forces.

In the face of such challenges, the Army's NBC modernization efforts are many, but all are predicated on three fundamentals: NBC defense systems and equipment must provide superior performance, stress multiservice utility, and reduce both deployment and logistical costs.

The major goals of our modernization strategy is shown in Figure P-3.

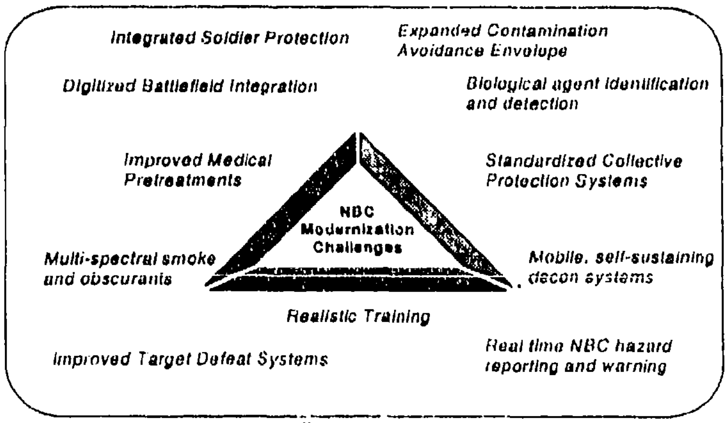


Figure P-3

SECTION 2

WARFIGHTING CONCEPT

"The continuing worldwide trends toward increased proliferation of WMD and acquisition of long-range delivery systems makes it imperative that U.S. forces be prepared to conduct operations in a NBC environment...."
Report of the Defense Science Board Task Force on Readiness, June 1994

Threat.

NBC weapons programs proliferated throughout the developing world in the 1960s. Many such programs reached maturity in the 1980s; that decade saw the use of chemical and toxin weapons on battlefields in North Africa, the Middle East, and Southeast Asia. Today, NBC weapons programs are maturing and expanding even further. Virtually all states with NBC weapons have deep strike capabilities via their ballistic missile programs (Figure P-4).

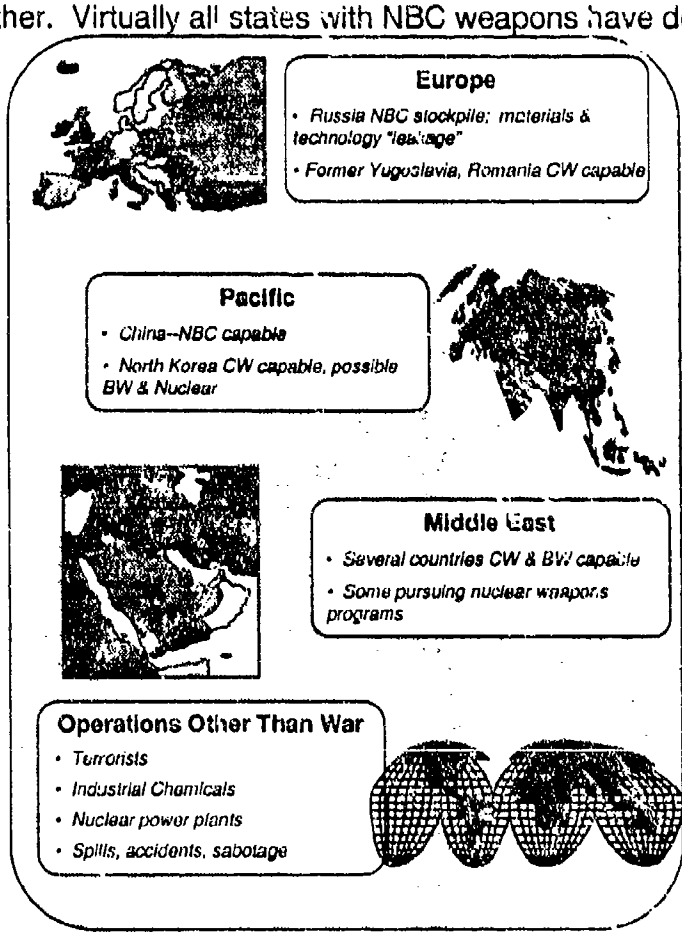


Figure P-4

In addition to the five declared nuclear states, an additional four, possibly five third world states may have nuclear weapons. Russia and the former Soviet Republics have 30,000 nuclear weapons. By contrast, third world nuclear capable states have some few, low yield nuclear weapons deliverable by aircraft, missile, or by unconventional means such as trucks or ships. Their nuclear weapons employment doctrine is less defined than that of the former Soviets Republics, and their criterion for use is less predictable.

Any nation can turn its medical and pharmaceutical facilities to the development of Biological Weapons (BW). BW agent production requires no special production equipment and precursor material. BW treaty verification is difficult because few such materials are restricted or monitored. BW agents can be delivered

by missiles, aerosol generators, aerial line sprays, and covert agents. As many as 25 nations produce and stockpile chemical weapons (CW), with delivery systems ranging from mortars and howitzers to missiles and bombs. The outbreak of pneumonic plague in India in 1994, and the ensuing panic it caused illustrates the potential results of the use of BW.

Since the Nuclear Nonproliferation Treaty went into effect, the number of nuclear capable states has doubled. Since the Biological Warfare convention went into effect, the number of states with offensive BW program has increased four-fold. Despite the intent of the latest multi-lateral arms control effort--the Chemical Weapons Convention (CWC)--a number of CW capable states have refused to sign the CWC, and others are constructing underground facilities to hide, protect, and expand their programs. Arms control efforts alone can not guarantee the absence of WMD on the future battlefield.

NBC Mission Area.

The NBC mission area has three components: **NBC defense, smoke and obscurants**, and **Flame/Incendiary and Nonlethal (FINL)** munitions. Each component supports force protection and survivability.

NBC Defense consists of three tenets to provide a complete NBC warfighting capability: **contamination avoidance, protection** and **decontamination** (Figure P-5). Each pillar is essential to successful operations in WMD threat environment;

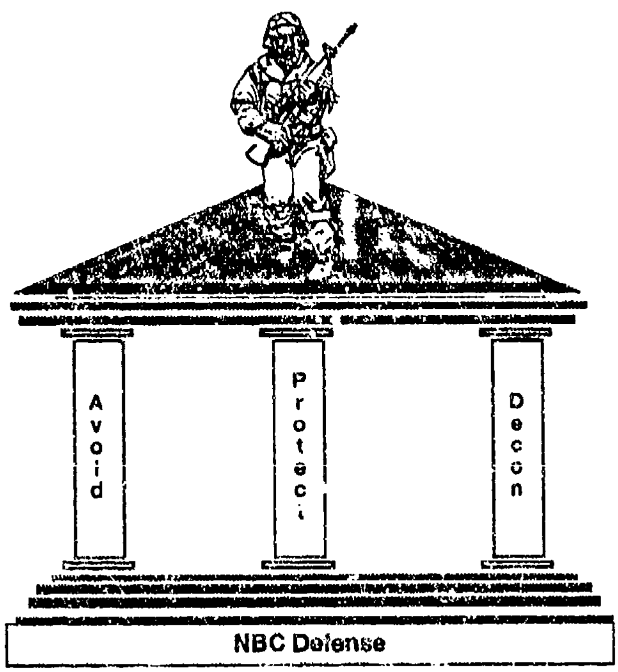


Figure P-5

- **Smoke and obscurants,** in particular infrared and millimeter wave obscurants, enhance the survivability of our forces. By both limiting the threat's ability to acquire or track friendly forces and defeat directed energy weapons, smoke and obscurants markedly improve our ability to wage successful battles; and,

- **Flame/incendiary and Nonlethal (FINL)** munitions are useful in wartime as well as peacekeeping activities to limit military and collateral casualties.

MODERNIZATION STRATEGY.

Our modernization strategy focuses on developing multifunctional, multiservice, easy to use and maintain, lightweight equipment through the near-(FY 95-96), mid- (FY 97-00) and far-terms (FY 01-09). The success of this strategy depends on consistent funding throughout the program and extended planning periods. The strategies discussed below are unconstrained; that is, they do not reflect actual funding, but rather the achievable capabilities assuming full funding. Section 3 discusses funding constraints. Our specific modernization priorities are:

- Field a comprehensive biological defense capability;

- Upgrade NBC reconnaissance capabilities;

- Develop standoff chemical vapor detectors;

- Develop an NBC hazard prediction and warning system;

- Develop automatic and integrated alarms and detectors;

- Improve NBC protective equipment, including masks, protective suits and collective protection;

- Develop more efficient decon systems and noncorrosive decontaminants;

- Develop enhanced smoke and obscurant systems; and,

- Develop both improved flame and nonlethal, equipment-defeating munitions.

Contamination Avoidance.

This tenet represents the primary goal of NBC Defense. If we can detect, warn, and therefore avoid contamination, soldiers will be better able to survive and accomplish their mission. Contamination avoidance consists of: detection, identification and warning; and NBC reconnaissance. Each has a nuclear, biological and a chemical component; and each component represents a different challenge in

terms of detection and identification. The following graphics highlight the modernization of our capabilities within the various components of contamination avoidance.

In the nuclear component, emphasis in the near- and mid-terms must be on modernizing unit level capabilities--providing highly accurate, digital instruments. In the far-term, the acquisition of an aerial system to detect nuclear contamination from a stand-off distance on the battlefield is necessary (Figure P-6).

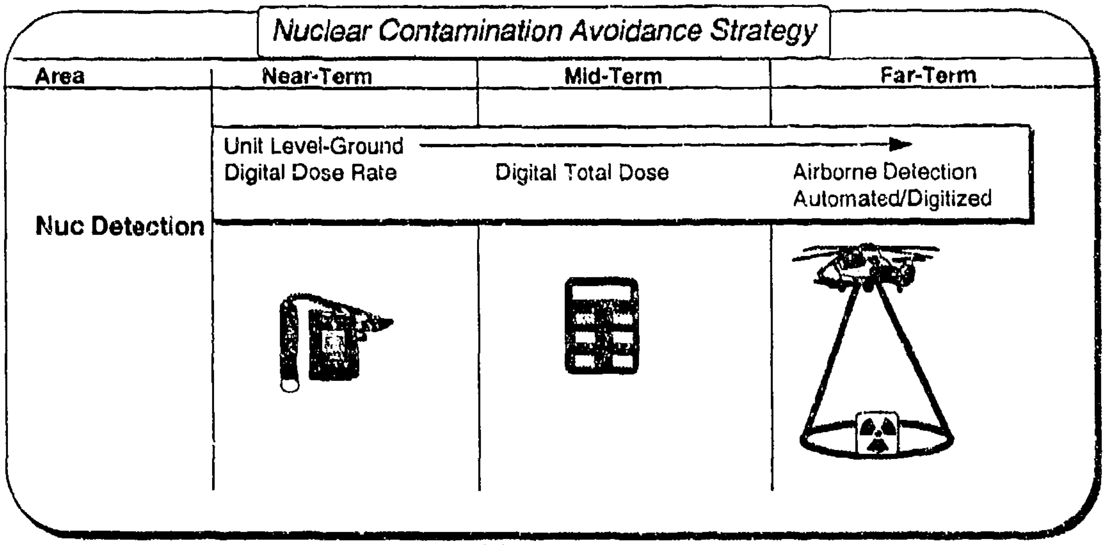


Figure P-6

In the chemical component, the NBC Reconnaissance System (NBCRS) continues to improve with upgrades in both the mid- and far-terms, including the introduction of a short range (up to 5 kms) standoff chemical vapor detection capability in the mid-term (Figure P-7). In the far-term also, an aerial (UAV or satellite) platform that provides real time coverage of large areas of the battlefield as well as remote, unattended sensors is needed. Also in the mid- and far-terms, unit level detection capabilities are improved with the introduction of multiagent point detection systems and a standoff capability to detect agent vapor clouds.

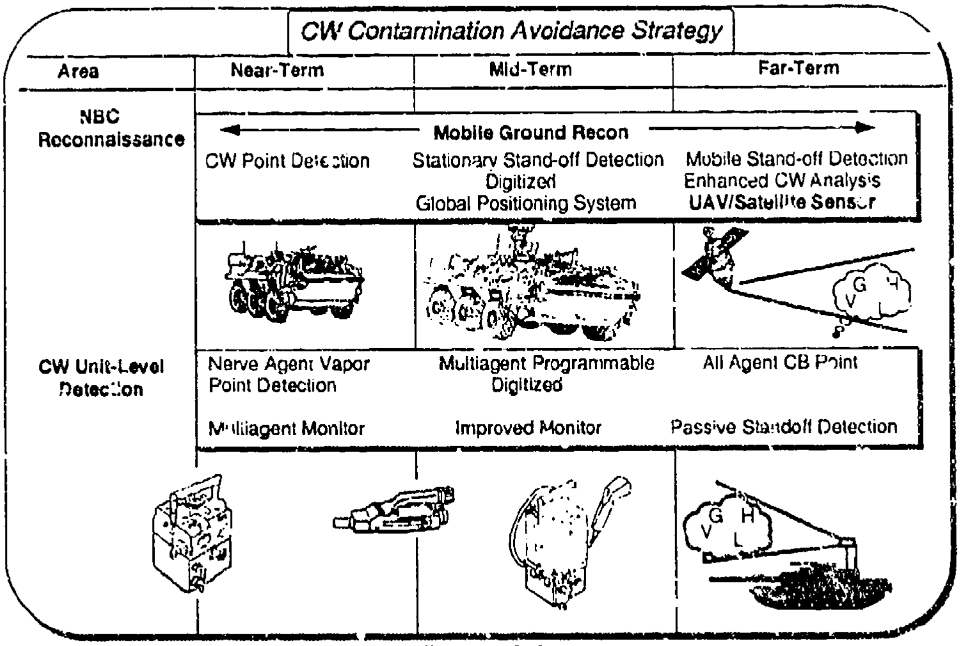


Figure P-7

Fielding a biological detection and identification capability remains the highest priority of NBC defense through the mid-term. Current strategy provides a Biological Integrated Detection System (BIDS) equipped company in FY 96 that provides a ground-based point detection and limited identification capability. Follow-on improvements in detection technology are fielded in an upgrade program for the basic BIDS vehicle. By the far-term, the goal is to field 3 BIDS-equipped companies and both long and short range stand-off systems (Figure P-8).

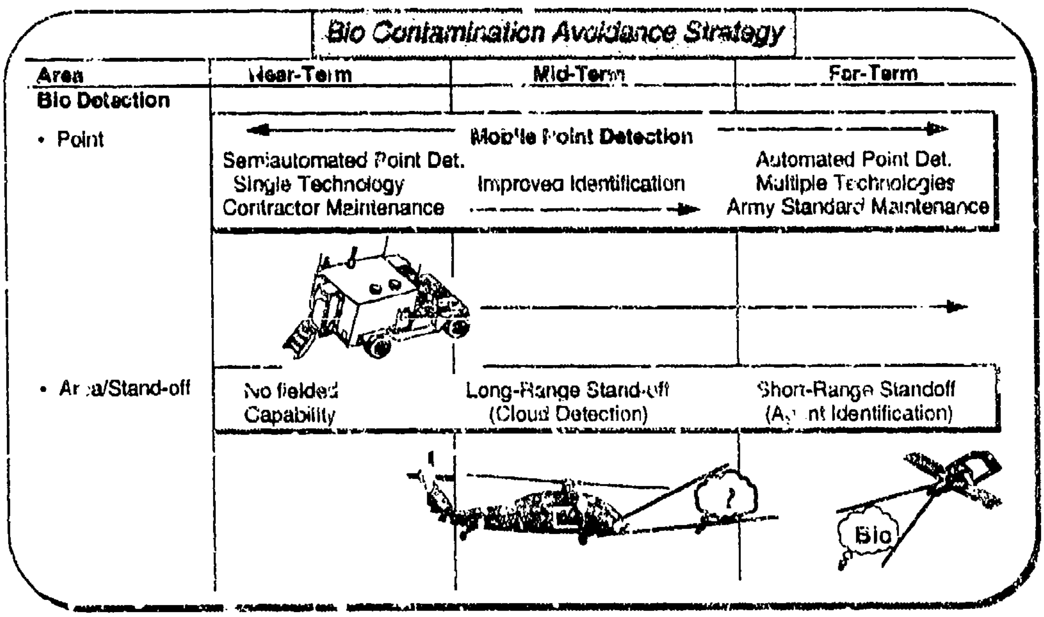


Figure P-8

NBC defense requires near instantaneous, and wide spread warning and reporting capabilities. In the future, the Army progresses from voice reporting of NBC attacks and manual hazard prediction to automatic announcement of NBC attacks and prediction via all sensor sources through standard digitized tactical communications. This network carries concurrent automatic dissemination of hazard predictions as well (Figure P-9). Combined in this way, all commanders will have a common, real time picture of the battlefield NBC hazards.

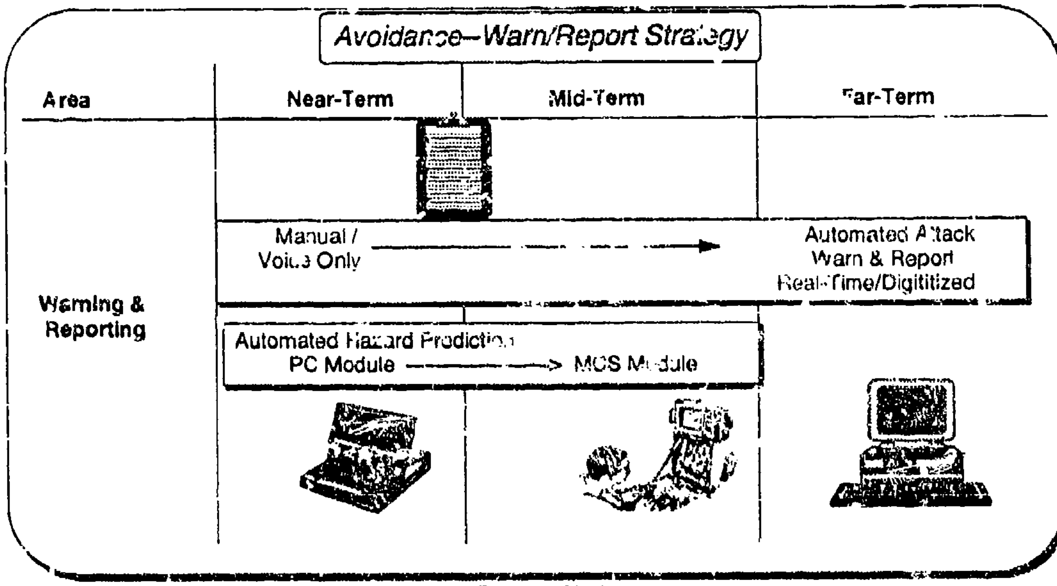


Figure P-9

Protection.

The second tenet of NBC defense encompasses individual and collective protection. Our modernization strategy for individual protection focuses on a multiservice, lightweight overgarment plus improved aviation protective capabilities in the mid-term, and on an integrated respiratory component in the far-term (Figure P-10).

Individual Protection Strategy

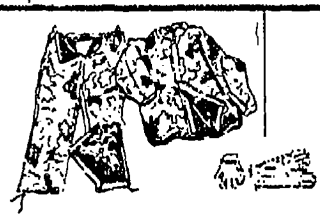
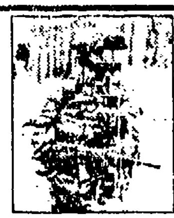
Area	Near-Term	Mid-Term	Far-Term
Respiratory Protection	Improved Soldier Mask	Improved Aviator Mask	Integrated Protection
			
Whole Body Protection	Lighter, less bulky Overgarment Improved Hand Protection		Integrated Protection
			

Figure P-10

Collective Protection (CP) improvements aim to reduce power consumption, maintenance, and logistics requirements of next generation CP systems for fixed sites, vans, shelters and combat vehicles, and tactical shelters (Figure P-11). See Annex Q, Combat Health Support, for additional information on CP for medical equipment.

Collective Protection Strategy

Area	Near-Term	Mid-Term	Far-Term
Shelters	Deployable Medical System Protection Chem-Bio Protective Shelter	Tactical Medical System	Fixed Site Protection
Vehicle-mounted		Standardized Modules - Vans/Shelters Advanced Filtration	LtWt Deployable Tactical Protection

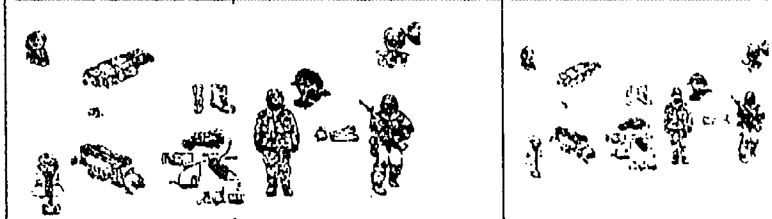


Figure P-11

Another aspect of NBC protection is **medical response.** This includes preventive measures such as vaccines for biological agents and postattack treatment such as nerve agent antidotes. See Annex Q (Combat Health Support) for specific modernization information on the medical aspects of NBC defense.

Decontamination.

This is the final tenet of NBC Defense. Improvements in the near-term focus on a battalion level equipment decon capability. Mid-term focus is on modernization of the vehicle mounted equipment decon capability. Far-term enhancements include new technologies for individual decon, waterless decon for electronics, and self-decon vehicle coatings (Figure P-12). The state of technology restrains advances in the latter two areas until the far-term.

Decontamination Strategy

Area	Near- Term	Mid -Term	Far-Term
Individual			New soldier decon
Unit--Equipment	LtWt Bn Equipment DeconCapability	Vehicle Mounted Decon High Pressure/Modular Reduced Logistics	Waterless Decon
Decontaminants			Less Corrosive Decontaminant Vehicle Self-Decon Coatings

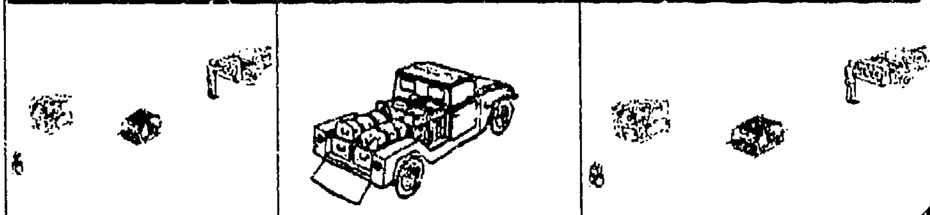


Figure P-12

Smoke and Obscurants.

Smoke and obscurants enhance survivability on the highly lethal battlefield by "blinding" or deceiving threat reconnaissance and target acquisition sensors (Figure P-13). They are a combat multiplier for the ground maneuver force. Modernization efforts aim, throughout, to increase the effectiveness of large area generated smoke, eventually providing effective obscuration through millimeter wave spectrums.

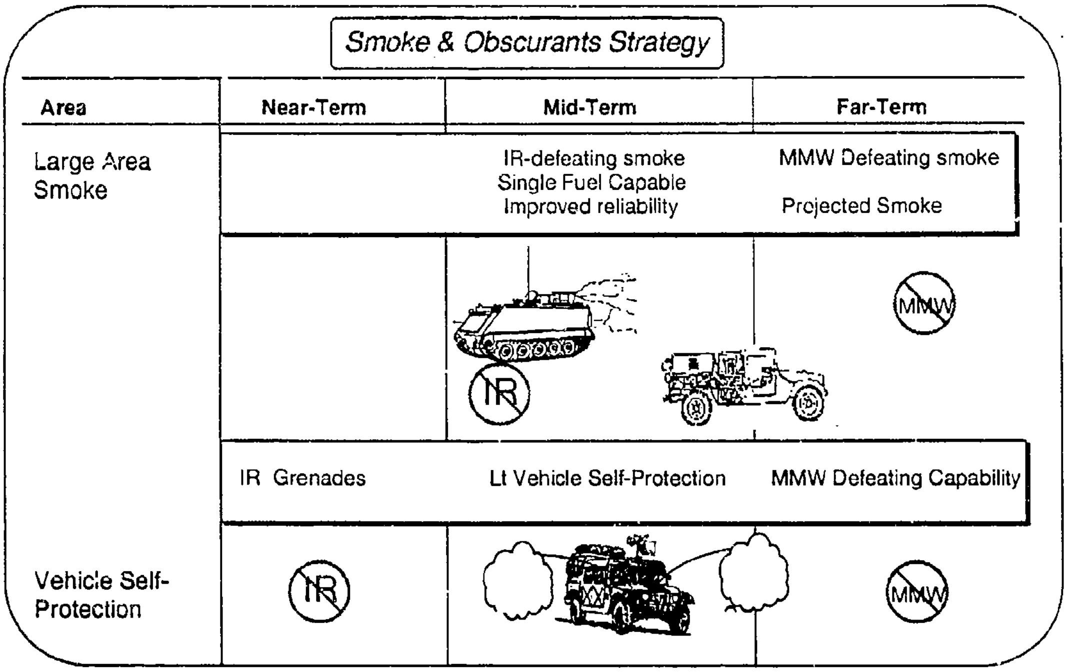


Figure P-13

FINL Munitions.

All planned programs in this area are in the FY 02-10 time-frame. User needs should become more definitive as the Army further defines its requirements for Operations Other Than War (Figure P-14).

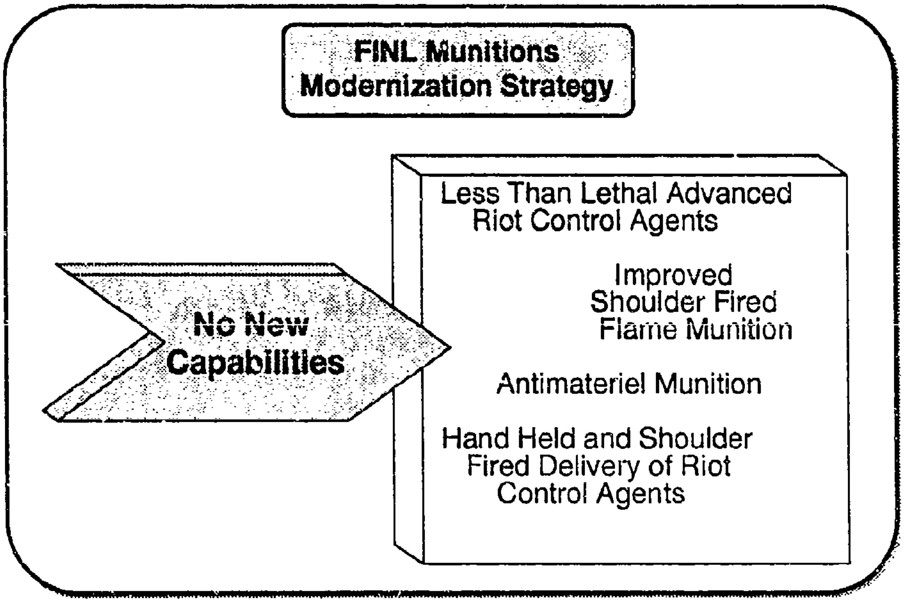


Figure P-14

Summary.

WMD will continue to proliferate into the foreseeable future. The threat of WMD exists in practically every region where US. national interests might require the deployment and employment of our armed forces. Providing these forces with the capabilities to operate successfully in WMD environments is mandated by our National Military Strategy.

The Army is implementing modernization of NBC defense, smoke and obscurants, and FINL weapons for two reasons: to improve force survivability and to mitigate mission degradation caused by the very equipment that protects the force. The strategy outlined here provides the technology overmatch necessary to ensure that we can **Protect the Force** and contribute to the Army modernization vision of **decisive victory with minimum casualties.**

"I believe one of our greatest challenges as a nation...will be to prevent the proliferation of weapons of mass destruction...not just nuclear, but chemical and biological..."

President William J. Clinton
November 1992

SECTION 3

CURRENT PROGRAM ASSESSMENT

Mission Area Program Assessment.

An assessment of the current program of NBC modernization is based upon the threat, present day capabilities, validated materiel requirements, and mission area modernization objectives. The assessment uses **GREEN/AMBER/RED** ratings, defined below, to provide delineation:

RED -- No capability exists, is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and,

GREEN -- Adequate capability and quantity exists to perform the mission.

NBC Defense.

The assessment is as follows:

Component	Near-Term (FY 95-96)	Mid-Term (FY 97-00)	Far-Term (FY 01-09)
Contamination Avoidance	AMBER	AMBER	AMBER
Protection	AMBER	AMBER	GREEN
Decontamination	AMBER	AMBER	AMBER

Contamination Avoidance.

This area is **AMBER** throughout the three program terms. The limiting factors in the near- and mid-terms are the lack of mobile standoff detection capabilities, and the limited quantities of reconnaissance, unit detection and automated warning equipment. The **AMBER** far-term rating is based on the limited quantities of all modernization items in all categories. For the most part, modernization does not program beyond Force Package 1 (FP1) due to funding constraints. This means that most of the Army will not see any capability improvements in this critical area. Without additional funding to correct this, units in **FP2 through 4** will have a **marginal capability**, at best, to **operate effectively** in an NBC environment. Figure P-15 shows the funding levels necessary to achieve a **GREEN** rating in the far-term.

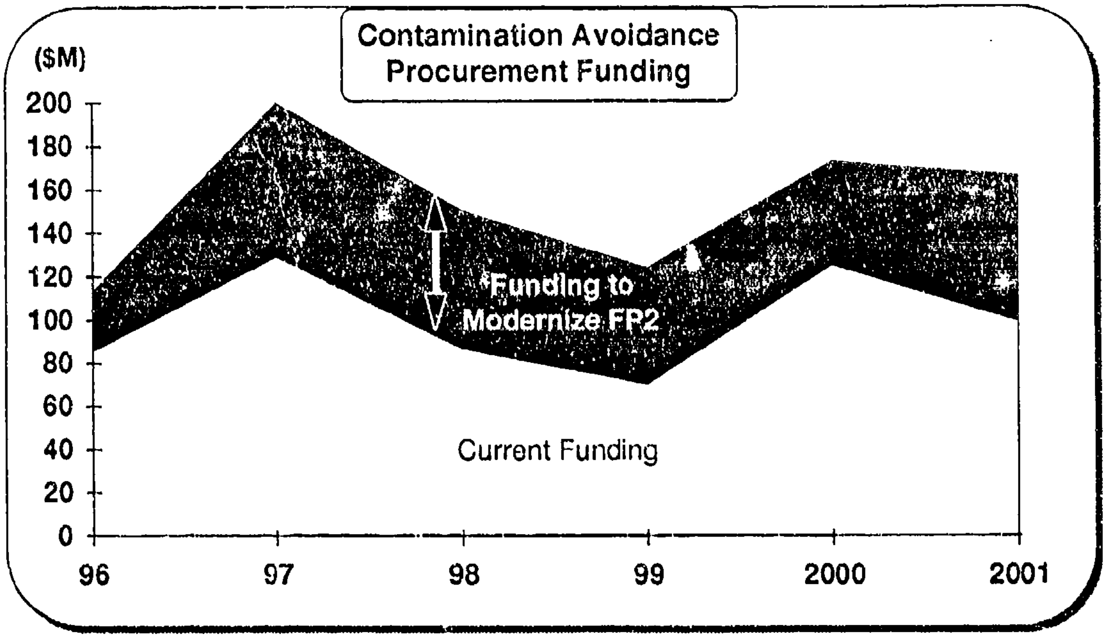


Figure P-15

Protection.

Near- and mid-term deficiencies include degraded soldier efficiency in protective gear; difficult to support and insufficient collective protection; mask sighting system interface limitations; and limited biological prophylactics, all of which cause this area to remain **AMBER.** However, far-term modernization eliminates these deficiencies and this area becomes **GREEN.**

Decontamination.

The lack of a waterless decon capability and the continued reliance on man-in-the-loop, logistically intensive equipment decon systems cause this area to remain **AMBER** through the far-term. Science and technology funding is inadequate to identify and develop possible solutions to these deficiencies. Additional funding of approximately $2 million per year for science and technology efforts in both the near- and mid-terms is necessary to achieve a technology solution and rate this area **GREEN** in the far-term.

Smoke and Obscurants.

Area assessment is as follows:

Component	Near-Term (FY 95-96)	Mid-Term (FY 97-00)	Far-Term (FY 01-09)
Smoke and Obscurants	AMBER	AMBER	AMBER

A modernized large area smoke capability is fielded to all force packages; however, multi-spectral smoke is limited to FP1. The limited availability of a multi-spectral smoke capability, the lack of a projected mobile smoke capability, and the limited numbers of vehicle self-protection systems keep this area **AMBER** in the far-term. Funding levels necessary to achieve a **GREEN** rating in the far-term are shown in Figure P-16.

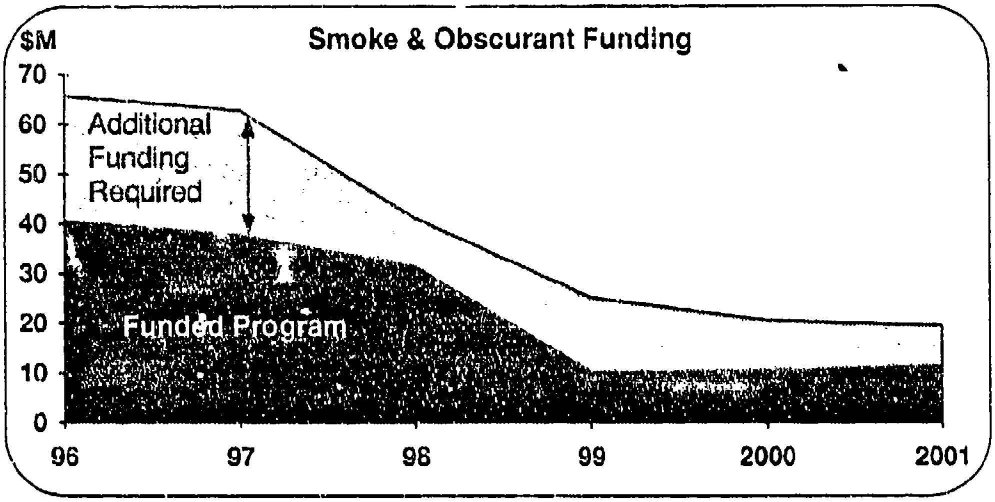


Figure P-16

FINL Munitions.

There is **no change** in the assessment of this mission area since the last assessment. The **RED** rating is due to limited flame/incendiary delivery capability and the lack of antimateriel and other nonlethal munitions.

Component	Near-Term (FY95-96)	Mid-Term (FY97-00)	Far-Term (FY01-09)
FINL Munitions	RED	RED	RED

SUMMARY

This assessment, summarized below, shows a different far-term picture than in the 1993 Army Modernization Plan. Then, three of five areas (Protection, Decontamination, Smoke & Obscurants) were **GREEN** in the far-term. Now, only Protection claims that rating. This decline in ratings is attributable to two causes: funding reductions and an expansion of far-term requirements that changed the conditions to achieve a **GREEN** rating.

Doctrine	Assessment Near-Term	Assessment Mid-Term	Assessment Far-Term
• **CONTAMINATION AVOIDANCE** – **Reconnaissance** – **Detection** – **Identification** – **Warning & Reporting**	AMBER	AMBER	AMBER
• **PROTECTION** – **Individual Soldier** – **Collective**	AMBER	AMBER	GREEN
• **DECONTAMINATION** – **Immediate** – **Operational** – **Thorough**	AMBER	AMBER	AMBER
• **SMOKE & OBSCURANTS** – **Large Area** – **Projected** – **Self Protection**	AMBER	AMBER	AMBER
• **FLAME/INCENDIARY & NON-LETHAL**	RED	RED	RED

Figure P-17

Still Contamination Avoidance moved from **RED** to **AMBER** in the near- and mid-terms due to improvements in the biological defense area. However, the cost over the Program Objective Memorandum (POM) period (FY 96-01) to change the assessment in this one area alone is over $600M. Additional funding, described previously could upgrade the far-term assessments in contamination avoidance, smoke, and decontamination. Further improvements in contamination avoidance remain the most pressing issue. Funding at current levels only maintain an **AMBER** rating in each of these areas.

SECTION 4

RESEARCH, DEVELOPMENT AND ACQUISITION STRATEGY

"Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after they occur."
General Guilio Douhet
1920

INTRODUCTION

The RDA strategy for the NBC mission area provides a long-range plan to enhance the capabilities in CB Defense, Smoke/Obscurants, and Flame/Incendiary and Less Than Lethal munitions for the Army of the 21st Century, Force XXI. The NBC RDA modernization strategy captures current efforts, as well as capabilities needed in the mid- and far-terms, to provide the critical assets needed for the 21st Century soldier to operate effectively in NBC contaminated environments.

SCIENCE & TECHNOLOGY

The foundation of the RDA strategy is a strong Science and Technology (S&T) program. The Army Science and Technology Master Plan (ASTMP) details the NBC Defense S&T strategy. The goal in NBC Defense S&T is to maximize the use of scarce resources by pursuing new technologies that enhance current warfighting capabilities, reduce/eliminate battlefield deficiencies, and are cost effective. Resources are prioritized for technologies in biological agent defense, standoff detection, individual protection, and modeling and simulation of NBC environments and systems. Efforts in decontamination, collective protection, smoke/obscurants and flame/incendiary and nonlethal technologies have been significantly reduced and refocused to provide far-term, leap ahead capabilities.

Exit criteria for all major science and technology programs are defined, and will be enforced, to ensure technology maturity and decrease transition risk. Advanced Technology Demonstrations (ATD) and Top Level Demonstrations (TLD) validate technology feasibility prior to transitioning to development. Where practical, these technologies are incorporated into the ATD and TLD such as the Integrated Biodetection and 21st Century Land Warrior (21CLW).

In addition to the ATD and technology demonstrations, the NBC Defense Program has five Science and Technology Objectives (STO) in the FY 95 ASTMP. A STO states a specific, measurable, major technology advancement to be achieved by a specific year. STOs focus the commitment of the S&T community to solve technological deficiencies within the NBC Mission Area. The NBC Mission Area STOs are: Integrated Biodetection, Antibody Manufacturing Development, Millimeter Wave

Screening, Chemical and Biological Modeling and Small, Lightweight Chemical Detector.

Near- and mid-term demonstrations are:

- **Lightweight Standoff Chemical Agent Detector** (FY 92-95) for chemical detection "on-the-move" at distances up to 5 km:

- **Integrated Biodetection** ATD (FY 96-99) discussed later in this section;

- **Advanced Filtration Concepts** (FY 95-97) to prove feasibility of improved filtration systems with reduced size, weight, logistics burden, plus improved filtration capability, and integration into various combat system applications;

- **Millimeter Wave Screening** (FY 97-98) to demonstrate the feasibility of a millimeter wave obscurant generating system to prevent threat radar from observing, acquiring, targeting, and tracking friendly forces;

- **Biological Warfare (BW) Production Facility/Storage Neutralization** (FY 98-01) to develop and demonstrate the technologies necessary for BW containment and neutralization of threat BW production and storage facilities, e.g. a munition delivered foam.

In the far-term, these demonstrations are planned:

- **Small, Lightweight Chemical Detector** (FY 00-02) to demonstrate an advanced lightweight, low power, reliable chemical detection concept capable of selective detection of low levels of chemical agents;

- **Advanced CB Decontamination** (FY 00-03) to demonstrate catalytic or induced reactive coatings for reduced manpower and logistics;

- **NBC Oracle** (FY 02-04) to demonstrate the linkage of multiple existing and developmental detectors/sensors to C4I systems using modeling, simulation and artificial intelligence technologies;

- **Chem Seek** (FY 03-06) to demonstrate an extended detection range capability for high altitude reconnaissance using advanced passive interferometry and signal processing; and,

- **Multi-spectral Weapons Defeat** (FY 04-07) to demonstrate the ability of multi-spectral materials to obscure or defeat enemy reconnaissance, surveillance and target acquisition (RSTA) assets in broad bands of the EM spectrum.

RESEARCH & DEVELOPMENT

Modernization efforts develop versatile systems and modular components tailorable to existing systems. Examples are multiagent sensors, multipurpose decontaminants, and multi-spectral obscurants. NBC collective protection system designs facilitate integration into host vehicles, aircraft, and shelters. Such integration efforts ensure significant gains in operational survivability and mission sustainment at modest incremental costs, and provide the basis for horizontal integration across other combat platforms.

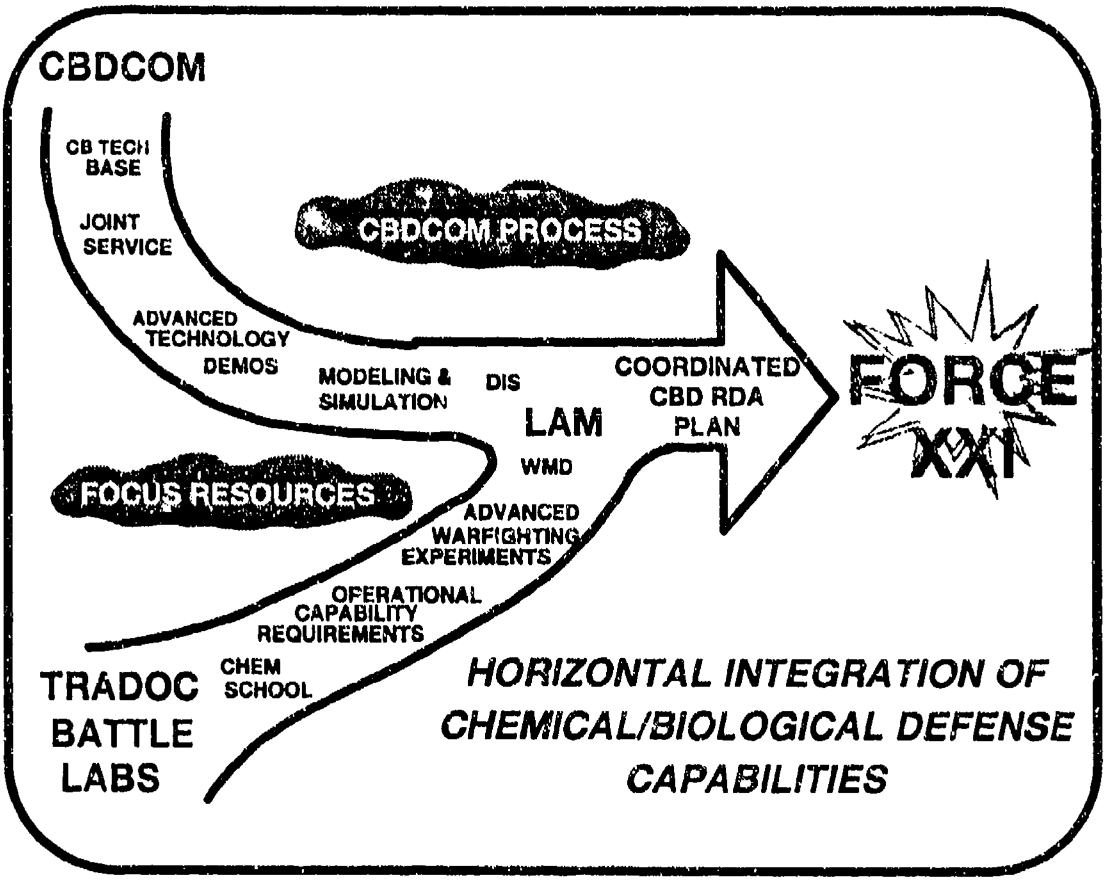


Figure P-18

NBC modernization efforts are closely linked to the needs of the TRADOC Battle Labs. The "voice of the soldier" is being captured for both wartime missions and Operations Other Than War. The FY 94 Louisiana Maneuvers (LAM) "Weapons of Mass Destruction" issue provides a mechanism to re-evaluate the Army's operational and readiness posture for contingencies where NBC weapons may be used (Figure P-18). There have been significant developments in our efforts to integrate both the battlefield effects of NBC weapons and the effectiveness of our modernized NBC defense systems into battle simulations and war games.

NBC weapons proliferation and their effects can radically change the nature of battlefield dynamics. TRADOC's Battle Labs are partnered with the Army materiel developers to better define and prepare the modernization strategy for a number of CB Defense systems and components. The Dismounted Battlespace Battle Lab is the Army's lead agency for biological defense and WMD. The Mounted Battle Lab is evaluating the Vehicle Integrated Defense System (VIDS); it includes NBC sensors, self-protection smokes, and CB collective protection components. The Early Entry, Lethality and Survivability Battle Lab is experimenting with ground robots carrying NBC sensors and is also interested in less than lethal technologies for Operations Other Than War. The Battle Command Battle Lab monitors the progress of detection and warning systems for integration into the digitized battlefield. The Depth and Simultaneous Attack Battle Lab evaluates simulations of high altitude and boost phase intercept of CB agent filled ballistic missiles.

PROGRAMS

BIOLOGICAL DETECTION

The goal of the biological detection area is to provide a real time capability to detect, identify, locate and quantify biological warfare agent threats below incapacitating levels. Current emphasis is on multiagent point detection with identification and standoff detection, ranging, and mapping. To meet needs in the coming 3 to 5 years, a number of individual sensors are being developed while detection technology matures. Technology focus is on detection sensitivity and specificity across the evolving spectrum of biological agents. System size, weight, range, signature, and false alarm rate, as well as selection of platforms and employment echelon, are also evolving. The NBC Defense S&T strategy currently calls for one formal ATD for integrated biodetection in FY 96-99. This ATD highlights advanced biological detection and contamination avoidance capabilities for unit reconnaissance, detection and warning applications.

The ATD focuses on point biosensors with enhanced reliability, stability, sensitivity, and response times. Biological Integrated Detection System (BIDS) objective system and next generation systems incorporate these biosensors. Demonstration of standoff biological agent cloud detection, identification, and mapping using active laser systems at 5-50 km is also planned (Figure P-18). Key to the ATD is the integration of point and stand-off detection technologies into a full battlefield biodetection system.

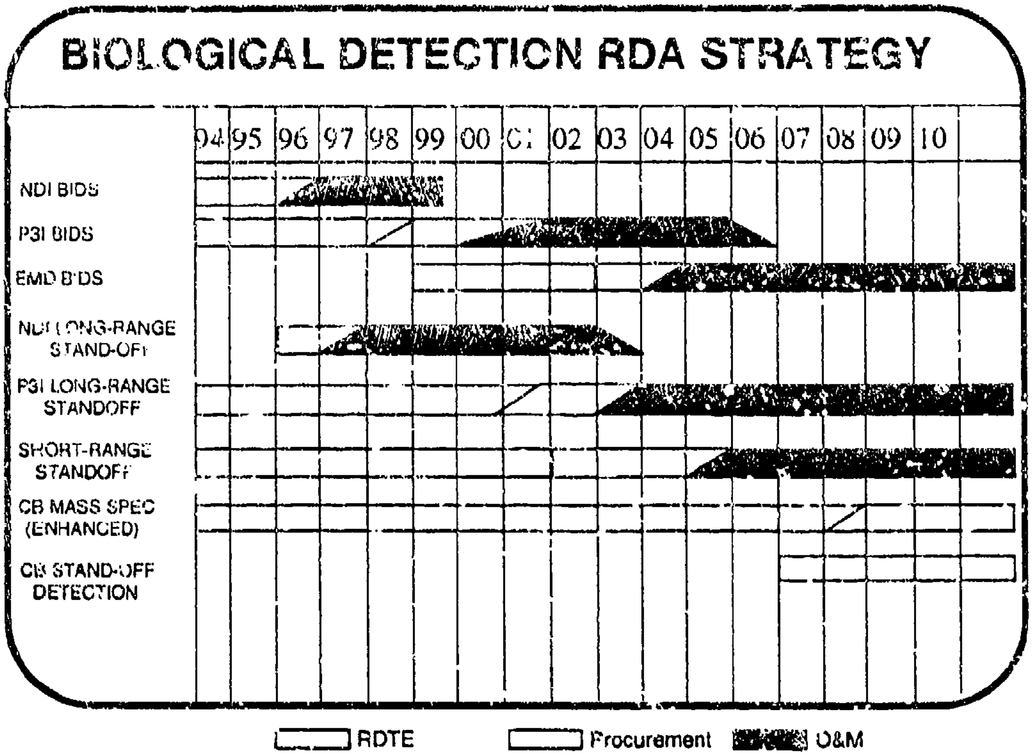


Figure P-19

In the near-term, the BIDS, a Nondevelopmental Item (NDI), provides the capability to quickly (i.e., within minutes) identify nonspecific biological material on the battlefield. Preplanned BIDS improvements increase sensitivity response time and automate many of the technical procedures. Critical to successful use of the BIDS is shortening the time to provide warning(s) to effected units. The ability to identify a biological agent within a matter of hours, rather than days, using complete laboratory analyses, allows the prompt medical treatment of exposed soldiers.

Also in the near-term, the NDI Long-range Standoff Biological Detection System (LRSBDS) provides the capability to detect (identification is not yet feasible) and map suspected biological agent clouds/aerosols at ranges to 50 kilometers. The NDI LRSBDS, a helicopter mounted system, is being optimized to discriminate agents from naturally occurring background biological materials. Planned improvements focus on reducing size and weight, increasing the detection range (to 100 kilometers), and improving the safety of the laser subsystem. In the mid- and far-terms, a Short Range Standoff Biological Detection System (SRSBDS) is planned for ranged detection and identification of biological agents to 5 kilometers. The ability to quickly and automatically confirm the presence of biological material, distinct from naturally occurring, or "background" materials, allows personnel to don protective gear or implement contamination avoidance procedures quickly, and when necessary to remove their gear when the hazard no longer exists.

CHEMICAL DETECTION

The focus of chemical detection is on multiagent sensors and detectors to provide real time detection and identification of chemical agents.

In the near-term, the NBC Reconnaissance System (NBCRS) consists of currently available nuclear (Geiger-Mueller tube technology) and chemical detectors (ion mobility, mass spectrometry). Improvements to NBCRS--such as standoff detection--are made through upgrades and replacements to enhance its capabilities (Figure P-19).

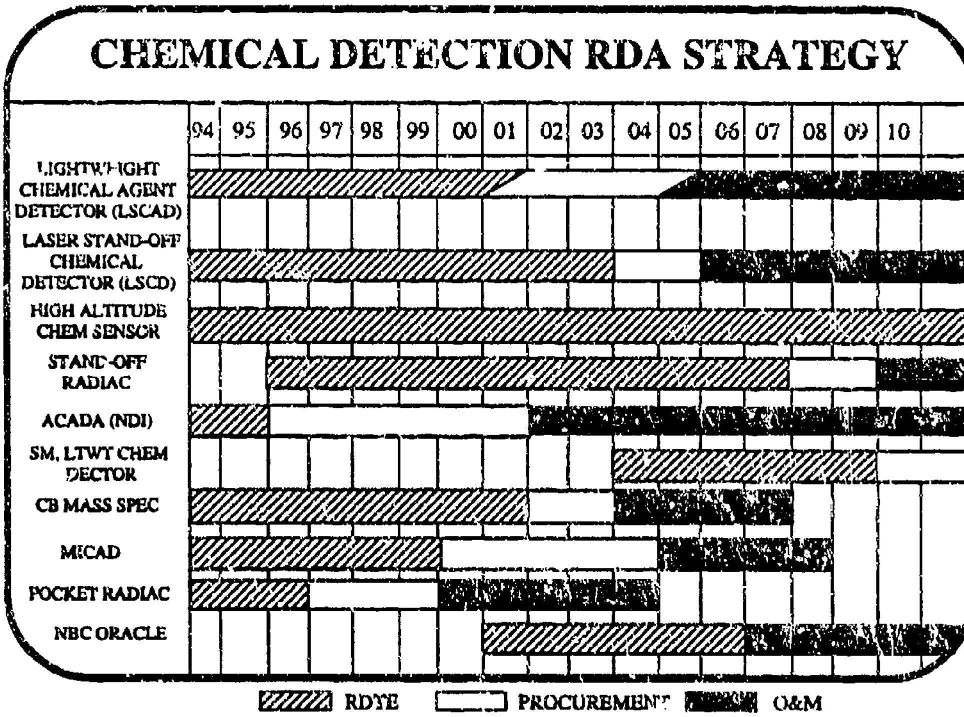


Figure P-20

Stand-off sensors for manned and unmanned aerial platforms add enhanced contamination avoidance capabilities. Technologies such as passive interferometry (for ground and aerial reconnaissance), mass spectrometry (for biological and unknown chemical agent identification), infrared (IR) and ultraviolet (UV) lasers (for standoff chemical and biological detection), and digital signal processing (for detection on the move) are being explored.

The strategy for unit level detection and warning focuses on providing an NDI automatic point detection capability of chemical agents in the near-term, improved chemical and first ever biological agent detection capabilities in the mid-term, and a soldier's generic sensor in the far-term. Emphasis is on smaller sensors with sensitivity levels low enough to alarm soldiers before they experience any harmful effects. These

continuously enhanced multiagent sensors exploit advances in biotechnology (receptor sites, DNA probes), microelectronics and miniaturization technologies. In addition, the Multipurpose Integrated Chemical Agent Alarm (MICAD) integrates a radio frequency communication and warning network for automatic transmission of early warning NBC information from remotely emplaced unit detectors. The NBC Oracle, a follow-on concept, envisions an automated modeling, warning, and reporting system, with Commander's decision aid and hazard prediction capabilities.

PROTECTION

The objective of the protection area is to provide protection against threat agents to minimize casualties and sustain the mission. The M40/42 and AirCrew Protective Mask (ACPM) (XM45) provides protection against current chemical agents using a face mounted canister.

Advanced respiratory protection equipment provides increased protection against current and future threat agents, and reduces the physiological and psychological burdens imposed by CB protective gear. Emphasis is on developing improved respirator performance and physiological design parameters; integrating CB protection with protection from environmental, ballistic and other threats; and improving weapons systems interface. These efforts support the 21CLW TLD.

Figure P-21 outlines the various components of the Protection RDA strategy.

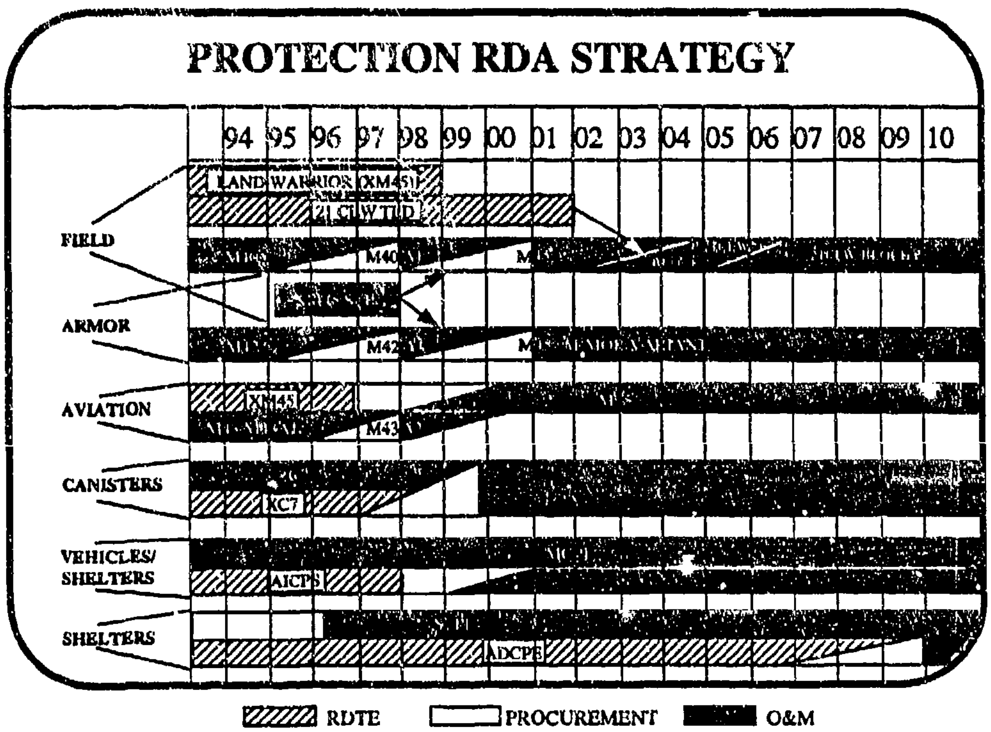


Figure P-21

The Joint Service Lightweight Integrated Suit Technology (JSLIST) is a three phased program that spans the near- to far-terms. It incorporates approved protective clothing technologies into one suit to meet the Joint Service requirement for the next generation of CB protective clothing for all the Services. Protective clothing and handwear/footwear research focuses on developing new air permeable materials for CB overgarments, gloves, boots, rainwear, and garment components. These items provide improved protection against CB agents while minimizing the physiological and psychological detriments associated with wearing CB protective ensembles. These detriments include thermal stress and moisture removal, loss of dexterity, tactility, mobility, and the ability to communicate. New or improved material evaluation methodologies are being explored. Once materials demonstrate the desired CB protective characteristics and the established physiological performance parameters, they are integrated into the JSLIST CB ensemble.

Weapons platforms will integrate Collective Protection (CP) with regenerable filtration capability, providing continuous air filtration for unit sustainment in a CB environment and eliminating the logistics and maintenance burdens of filter replacements. One regenerable filtration technology, Temperature Swing Absorption, will be demonstrated in early FY 95. Advanced Integrated Collective Protection (AICPS) for Vans, Vehicles and Shelters integrates a CB filtration system with environmental control and power systems. Future CP systems will be smaller, lighter, and will use less power.

DECONTAMINATION

Sustaining mission operations by reducing decontamination "downtime" and the number of people it takes to decontaminate, is the focus of the NBC decontamination strategy (Figure P-22).

Emphasis is on noncorrosive, environmentally safe, all agent decontaminants for combat systems, personal equipment, and sensitive electronics.

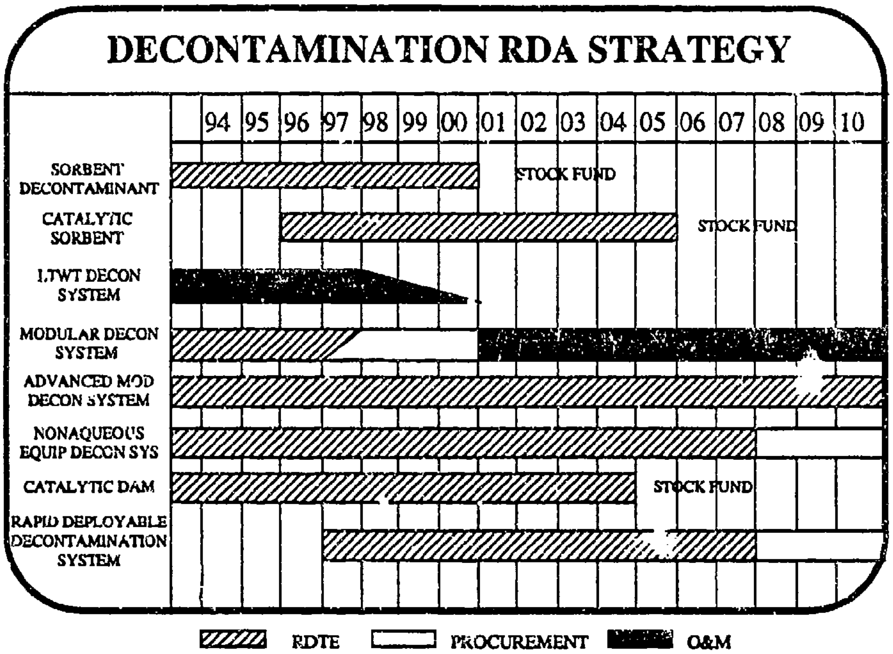


Figure P-22

Currently, soldiers can perform only basic decontamination with rapid, effective results. We will employ lightweight, deployable, and modular systems for thorough decontamination operations.

In the near- ar⁻ mid-terms, reactive sorbent materials are in development for decontamination of . .sonal equipment, vehicle interiors, and possibly skin. Strippable and barrier cc..tings for vehicles and aircraft ultimately eliminate contact hazards by reducing manual decontamination.

Enzymes offer a far-term solution; they are environmentally safe, noncorrosive, shelf stable, ar. l cost effective fc⁻ decontaminating vehicles, aircraft and equipment. These decontaminants, reconstituted with any av..ilable water supply, reduce the logistical issues of bulk storage and mass transit.

SMOKE & OBSCURANTS AND FINL MUNITIONS

In response to the proliferation of increasingly sophisticated Reconnaissance, Surveillance, and Target Acquisition (RSTA) capabilities throughout the Electro-Magnetic (EM) spectrum, the smoke and obscurant strategy capitalizes on technologies that provide multi-spectral screening capabilities (Figure P-23).

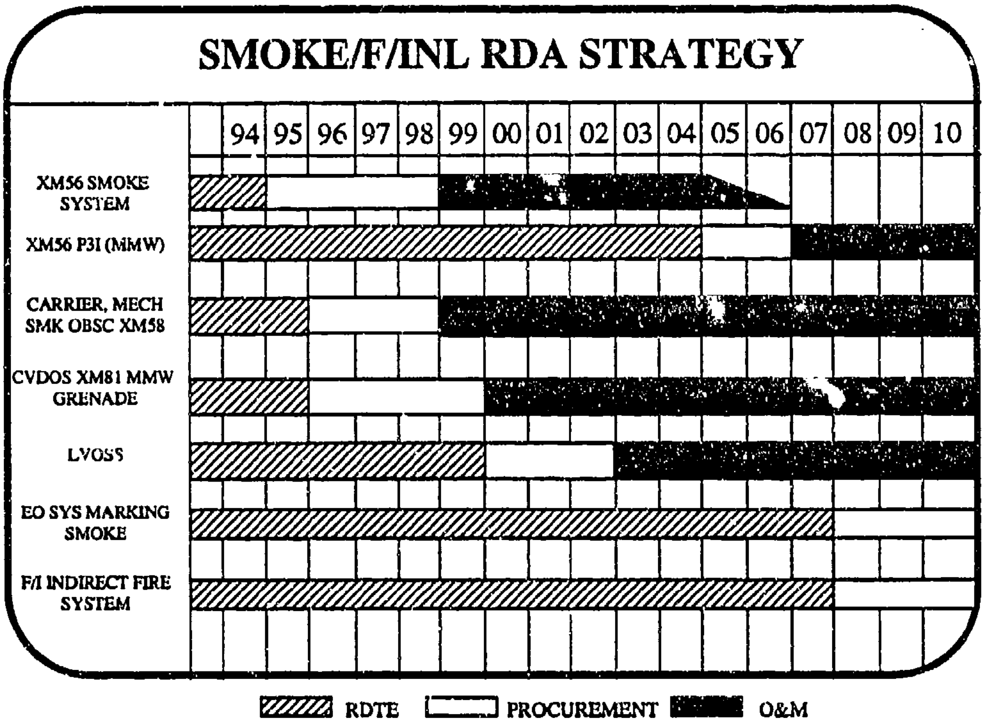


Figure P-23

The M56, Mechanical Smoke Generator, provides multi-spectral screening of the EM spectrum. It is deployable on either a light wheeled (XM56) or heavy tracked (XM58) vehicle to disseminate smoke materials. These environmentally and logistically acceptable, multi-spectral materials counter enemy RSTA activities in broader ranges of the EM spectrum for self-defense, large area coverage, and projected applications.

These technologies translate into 21st Century operational capabilities and modernized equipment that reduce the effectiveness of enemy target acquisition, detection, control, and covert communications systems.

FINL munitions provide increases in effectiveness across the spectrum of conflict, and throughout a range of weapons systems, from soldier fired to smart munitions. Anti-materiel concepts that provide mission kill capabilities against armored vehicles/equipment without causing personnel injury, are at "Tech Watch" level. The FINL RDA strategy is to increase the effectiveness of flame/incendiary munitions to attack both large area and hardened targets.

A new initiative in the FINL S&T area is to develop the means to mitigate the spread of contamination posed by the destruction of Biological Warfare (BW) production/storage facilities. This WMD counterproliferation effort provides a munition designed to destroy the contents of such facilities and contain the potential spread of spores and bacteria. A technology demonstration is planned for FY 98-01.

SUPPORT STRUCTURE STRATEGIES

BIOTECHNOLOGY

The CB defense modernization strategy is to invest in biotechnology to solve some of the most difficult challenges of chemical and biological defense. Enzyme technology has potential for use in both decontamination and detection DoD-wide. International interest in enzyme technology has culminated in the formation of NATO Project Group 31 (PG.31) "Aqueous Decontaminants for Nerve Agents and Mustard."

Potential technical transfer uses for enzyme technologies include:

- Clean up of pesticide and fuel/oil spills in situ; and,
- Alternatives to incineration for chemical demilitarization.

MODELING AND SIMULATION

The CB Defense modernization strategy includes Modeling and Simulation (M&S) technologies to evaluate the "value added" potential of developmental and conceptual NBC systems on the battlefield. The technology is an integral part of every developmental program and every phase of the acquisition cycle. The ability to play CB environment on the DoD Distributed Interactive Simulation (DIS) provides time and cost effective demonstrations of the impact of NBC warfare on the battlefield and also quantifies the criticality of CB defense.

The near-term M&S strategy is to:

- Incorporate NBC and smoke environments into a three-dimensional DIS;
- Develop "man-in-the-loop" simulator for the NBCRS for DIS;
- Demonstrate CB SCUD/Patriot missile intercept scenario on DIS;
- Include NBC and Smoke environments and target effects into the JANUS constructive wargame for use in LAM;
- Analyze high altitude CB effects for CB Tactical Missile Defense in both virtual and constructive simulations;
- Establish "virtual prototypes" of CB standoff and point detectors, obscurant systems, and antimateriel devices; and,
- Add NBC and smoke environments to additional wargames.

DIGITIZING THE BATTLEFIELD

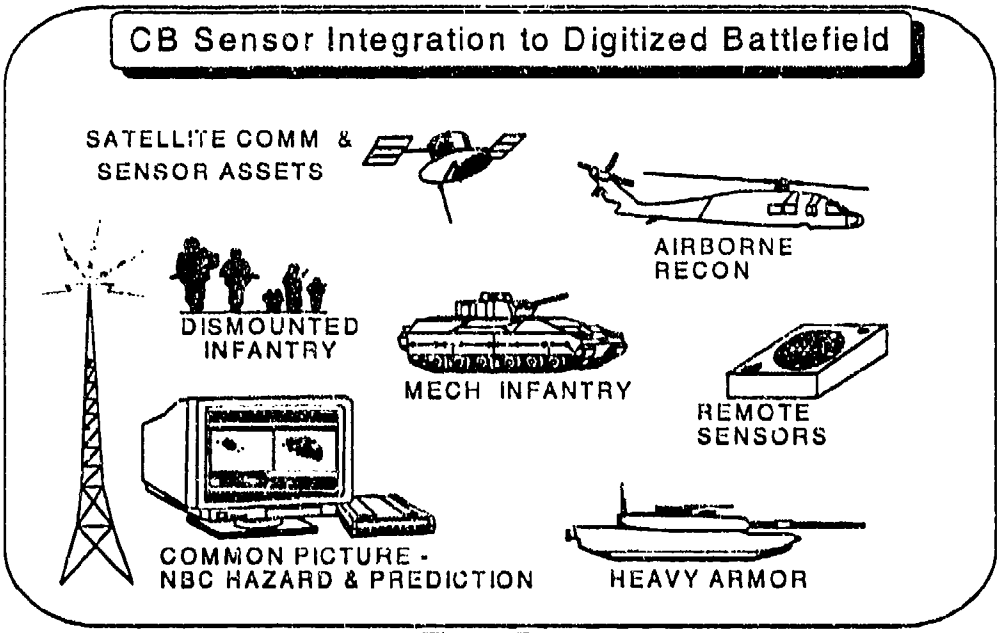


Figure P-24

The digitized battlefield offers opportunities to provide tactical commanders real time NBC attack/hazard information (Figure P-24). Our modernization strategy envisions NBC sensors linked to digital communications systems and NBC hazard analysis software to create real time, automatic NBC warning and reporting system from platoon through division.

NBC systems which contribute to this vision are:

Nuclear, Biological and Chemical Reconnaissance System-System Improvement Program (NBCRS- SIP).

Sensor, communications and automation upgrades, along with the Global Positioning System (GPS) installation, allow NBC recon elements to transmit critical NBC reconnaissance information in real time to battlefield commanders, thus improving our ability to more closely synchronize maneuver with contamination avoidance.

Multipurpose Integrated Chemical Agent Detector (MICAD) Network.

MICAD offers the capability to integrate platoon level chemical and radiological sensors with tactical command and control communications systems to provide real time, automatic NBC attack and hazard information. This greatly improves sharing of NBC information among commanders and staffs, and enhances the capability to synchronize battles under NBC conditions.

NBC Oracle.

NBC Oracle is a follow-on concept to MICAD that capitalizes on modeling and artificial intelligence technologies by adding a commander's decision aid software package. In addition to processing and transmitting digitized information from NBC sensors, the NBC Oracle uses cloud transport models to provide downwind hazard/casualty predictions and protective posture options. The NBC Oracle also provides a contamination mapping capability integrated with digitized terrain maps.

Chemical Standoff Detector.

A lightweight chemical sensor, capable of identifying agent clouds 3-5 kilometers away, and mounted in a Remotely Piloted Vehicle with digital transmission equipment, provides another capability to the commander to extend his view of the NBC battlefield. This complements the ground-based NBCRS, greatly improves our ability to avoid NBC contamination, and limits the operational degradation inherent to NBC battlefield conditions.

The Automated Nuclear, Biological, and Chemical Information System (ANBACIS).

ANBACIS is under development by PM, Operations Technical Data Systems (OPTADS) and the U.S. Army Chemical School. ANBACIS increases the effectiveness, reliability, and speed of chemical staff operations at battalion and higher levels: it improves the speed of transmitting NBC warnings and reports, and assists the planning of NBC reconnaissance, decontamination, and smoke operations. ANBACIS is part of the Army Global Command and Control System and the Maneuver Control System.

OPERATIONS AND SUPPORT COST REDUCTIONS (OSCR)

The SIP version of the NBCRS is extensively automated, reducing crew size from four to three. This reduction results in significant personnel and training cost savings over the life of the system.

Highly automated detectors now under development, significantly reduce operator training requirements. Built-In Test Equipment (BITE) is being added to reduce diagnostic and maintenance costs. The development of integrated multiagent and standoff detectors reduces the number of different detectors required. Overall, the ability to avoid contaminated areas, via enhanced all agent detectors, significantly reduces operation and support costs associated with NBC protection and decontamination.

In the collective protection area, the Army has gained substantial savings in disposal costs as a result of eliminating hazardous materials from the carbon fomulation in filter systems. Filter changes generate approximately 1.1 million pounds of hazardous waste per year at current filter replacement rates. Eliminating hazardous

materials from the filters yields a savings of $1.31/lb or a $114 million annually. Another major O&S cost savings is realized by the use of regenerable filter systems. Regenerable filters lower/eliminate filter change requirements, thus reducing the logistical supply and disposal burdens associated with current filter systems.

OSCR efforts in the decontamination area focus on eliminating environmental, storage, and disposal problems. Current efforts include development of an environmentally safe replacement for DS2.

DUAL USE

CB detection and protection are a specialized subset of a much larger environmental health and safety area. All CB detection and protection technologies can be modified to address the larger picture of environmental health and safety. The ability to detect, identify, locate, and quantify both industrial hazardous and medically infectious materials is highly desired by the commercial sector.

Opportunities to transition detection technology to commercial use hold promise for air monitoring, stack monitoring, water quality monitoring, site monitoring, process control, site abatement, toxic waste disposal, clinical diagnostic monitoring, and operating room monitoring. Over the next ten years, most, if not all, military technology for CB detection is expected to transition to the commercial sector for use in environmental health and safety.

There is a high potential for commercial applications of enzymatic decontaminants, including environmental cleanup of pesticides, toxic waste, and cleaning/reclaiming the equipment/site after the cleanups.

EMERGING MILITARY MISSION

The Army's role in Operations Other Than War (OOTW) is increasing. In July 1994, the Center for Army Lessons Learned (CALL), U.S. Army Combined Arms Center (CAC) released a booklet identifying a number of tactics and shortcomings in OOTW.

Technologies in the NBC mission area will focus on meeting this emerging mission. The checkpoints in foreign lands -- used for inspections of vehicles, packages, and/or persons -- will employ stand-off sensor technology to detect explosives in chemical or biological weapons. Checkpoints will have the ability to employ smoke grenades to screen in the event of sniper fire. The Less-Than-Lethal technology contributes advanced riot control agents to control small unruly crowds. Personal application of LTL technology to disable hostile individuals with no permanent physical damage under the new measured response Rules of Engagement (ROE) will also be addressed.

SUMMARY

The NBC RDA strategy provides capabilities which **overmatch the NBC threat** and protects our forces. It also reduces the number of end items, the requirements for manpower and logistics, and cost (Figure P-25). This strategy focuses on products which provide versatility, deployability, and survivability--all of which contribute to **Land Force Dominance** in the 21st Century.

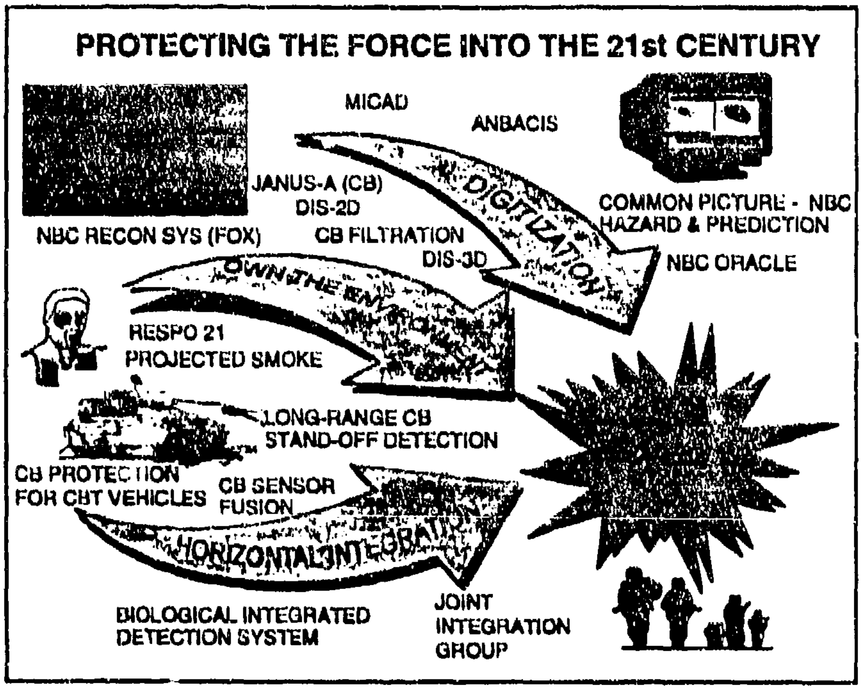


Figure P-25

SECTION 5

TRAINING

"When weapons of mass destruction are used, extensive destruction and mass casualties can result. Only cohesive, disciplined, physically fit, and well trained units can function in this environment."

FM 100-5, Operations, June 1993

GENERAL

The Army's NBC training strategy remains focused on providing our soldiers realistic and environmentally safe training to improve soldier readiness to fulfill their mission of Land Force Dominance. There are numerous components of this strategy (Figure P-26). Developmental efforts for simulations, simulators, and training devices focus on integrating NBC into all facets of training.

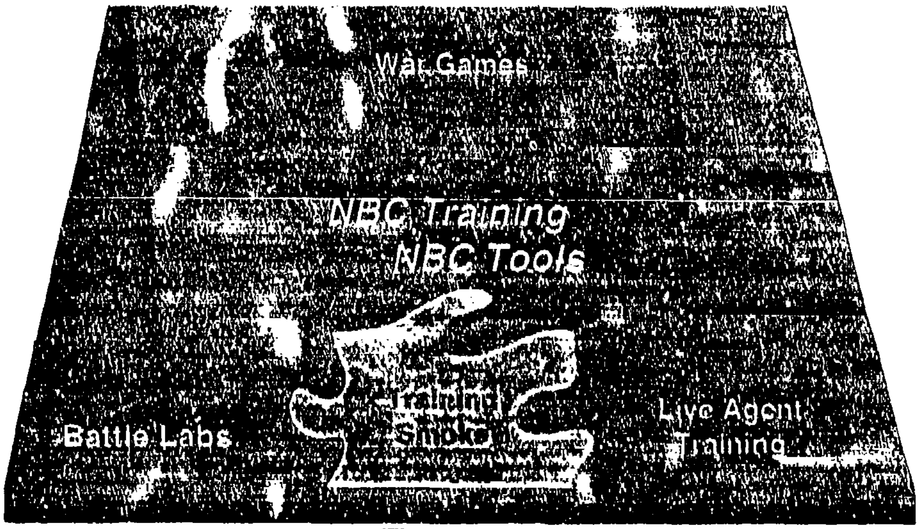


Figure P-26

SIMULATIONS AND WARGAMING

Simulations and wargaming, in conjunction with doctrine and training modernization, can identify capability gaps and assess new and evolving doctrine. Advanced simulations enable developers to evaluate new NBC defense technologies in the context of a variety of operational scenarios. These reduce risk and aid priority setting, both desirable during periods of decreased funding.

ANBACIS uses simulation to support decision-making by battlefield commanders. ANBACIS hazard plots provide much useful predictions for nuclear, biological and chemical attack hazard areas than do the current manual STANAG/ATP-45 plots. The former generates smaller and more accurate hazard areas, allowing battlefield

commanders to use more maneuver space without going into higher (and more burdensome) levels of protection.

TRAINING AIDS AND DEVICES

The Army requires development and acquisition of the following training aids, devices, simulants, and simulations to support training in NBC and smoke conditions:

Radiac Training System (RTS). The RTS is the umbrella system for future radiac training devices. Projected fielding date is FY 96.

Chemical/Biological Agent Delivery System (CBADS). The CBADS disperses simulants during training exercises in a safe manner. This program is not funded.

Chemical Simulation (CHEMSIM). This computer simulation is compatible with the "family of simulations" concept for training commanders and staffs in the full integration of NBC events. The simulation encompasses the use of a tactical maneuver simulator and the Chemical Corps unit capabilities. It is currently being developed to enhance Brigade/Battalion Battle Simulation by the National Simulation Center, Combined Arms Command Training.

XM83 Hand Grenade, Training Smoke and XM8 Smoke Pot, Training. These smoke systems offer environmentally safe training in the employment of smoke hand grenades and smoke pots. Projected available date is FY 96.

XM89 Infra-Red Defeating Smoke System (IRDSS) Trainer. The IRDSS is a surrogate munition which replicates smoke effects of the IRDSS. The training round is more environmentally safe and costs less. Projected available date is FY 95.

M82 66mm Smoke Grenade. This single training grenade, used in conjunction with the Combat Vehicle Defensive Self Screening System, simulates all types of grenades, thus reducing costs. Projected availability is FY 95.

Simulated Area Weapons Effects, Radio Frequency (SAWE-RF), Global Positioning System. This tactical training system produces NBC casualties via a radio wave contamination zone. Projected availability is FY 95.

Biological Integrated Detection System Simulator (BIDSS). This system provides realistic means to train biological agent detection in a simulated biological environment. Projected availability is FY 95.

Chemical Detection and Alarm Training Simulator (CDATS). CDATS provides embedded, realistic training capabilities, in a simulated chemical environment. Projected availability date is undetermined.

Troop Proficiency Trainer (TPT). The TPT provides NBC reconnaissance specialists comprehensive sustainment training on the FOX Phase III vehicle platform, thereby reducing training hardware and software cost. Added training components will be:

- **Fully embedded** i.e., training supported by components and software residents on the vehicle system;

- **Appended**, i.e., training using hardware strapped-on hardware to existing components when needed and removed when the components are not needed; and,

- **Umbilical**, i.e. physical connection to external components (computer, communication system, or instructor/operator console) are required. Projected availability date is yet to be determined.

This training section covers the areas specific to NBC. For further information about Army-wide training initiatives and issues, and detailed explanations of fielding and funding status, consult Annex R (Training) of this document.

Realistic training under simulated NBC conditions is necessary to ensure the Army is "NBC trained and ready". The best equipped force in the world demands world class training to maintain its combat edge. Our efforts to modernize NBC training hardware and software are essential components of that training.

SECTION 6

CONCLUSION

"The continuing worldwide trend toward increased proliferation of weapons of mass destruction (WMD)...makes it imperative that U.S. (and coalition) forces be prepared to conduct operations in a nuclear, biological, and/or chemical (NBC) environment...."
Report of the Defense Science Board
Task Force on Readiness, June 1994

While the probability of large scale nuclear warfare has diminished, the probability of more dangerous threats from a multitude of sources is increasing. Many nations have, or are acquiring, nuclear, biological, and chemical systems and components. These components can be stored, updated, and moved relatively easily, and securely. They constitute considerable threats. Modernization of our NBC capabilities is essential in order to Protect Our Force projection Army, and our nation, against these often unpredictable and clandestine, but no less menacing threats. Our modernization efforts aim to achieve (Figure P-27):

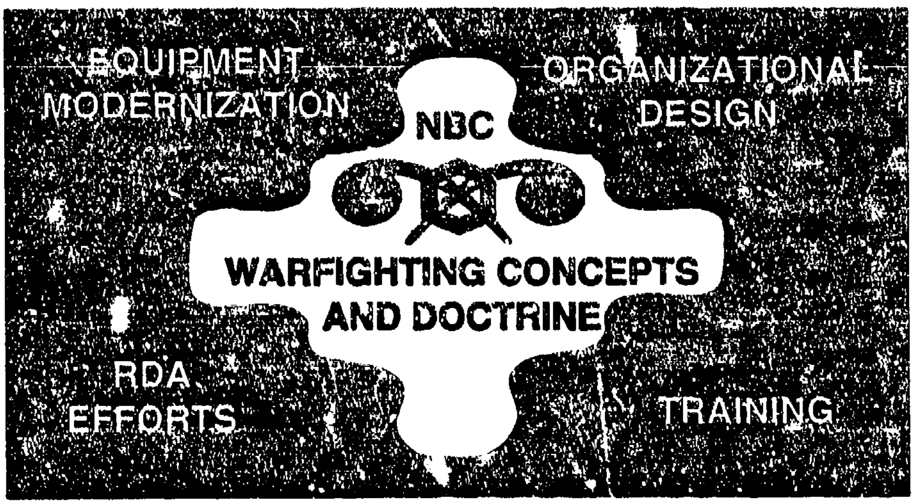


Figure P-27

- Solid NBC defense and smoke ***warfighting concepts and doctrine,*** grounded in the doctrinal tenets of initiative, agility, depth, synchronization and versatility;

- ***Tough realistic training*** that develops competent, motivated, and disciplined leaders and soldiers skilled in essential competencies, and capable of performing combat and OOTW missions in support of joint and multinational operations;

- A "lean and mean" NBC defense and smoke ***organizational design*** that is modular, flexible, rapidly deployable, and tailorable to enhance joint and multinational operations;

- The incorporation of advanced technologies in ***continuous equipment modernization*** to improve force protection against WMD; and,

- An ***RDA effort*** focused on user needs.

Investment in NBC defense readiness is key to deterring the proliferation and use of WMD by potential adversaries. The pace of technological advances, coupled with the proliferation of WMD, challenges the Army to maintain overmatch capabilities in NBC. Our current NBC defense investment strategy focuses on the development of systems and technologies to correct the most serious battlefield deficiencies within force structure and budget constraints. However, clearly increased investment in NBC modernization is necessary to ensure that we field sufficient NBC systems and capabilities to retain our deterrent and combat edge well into the 21st Century.

"Whether or not gas will be employed in future wars is a matter of conjecture, but the effect is so deadly to the unprepared that we can never afford to neglect the question."
GEN John J. Pershing
1920

ANNEX Q

COMBAT HEALTH SUPPORT

ANNEX Q

COMBAT HEALTH SUPPORT

SECTION 1

INTRODUCTION

The Army Medical Department (AMEDD) modernization program is impelled by a number of imperatives, all based on the AMEDD battlefield rules. The most important imperative, however, is that of providing an integrated Combat Health Support System (CHSS)--from the battlefield to the sustainment base within the continental U.S.--for soldiers. The AMEDD modernization imperatives are depicted in Figure Q-1.

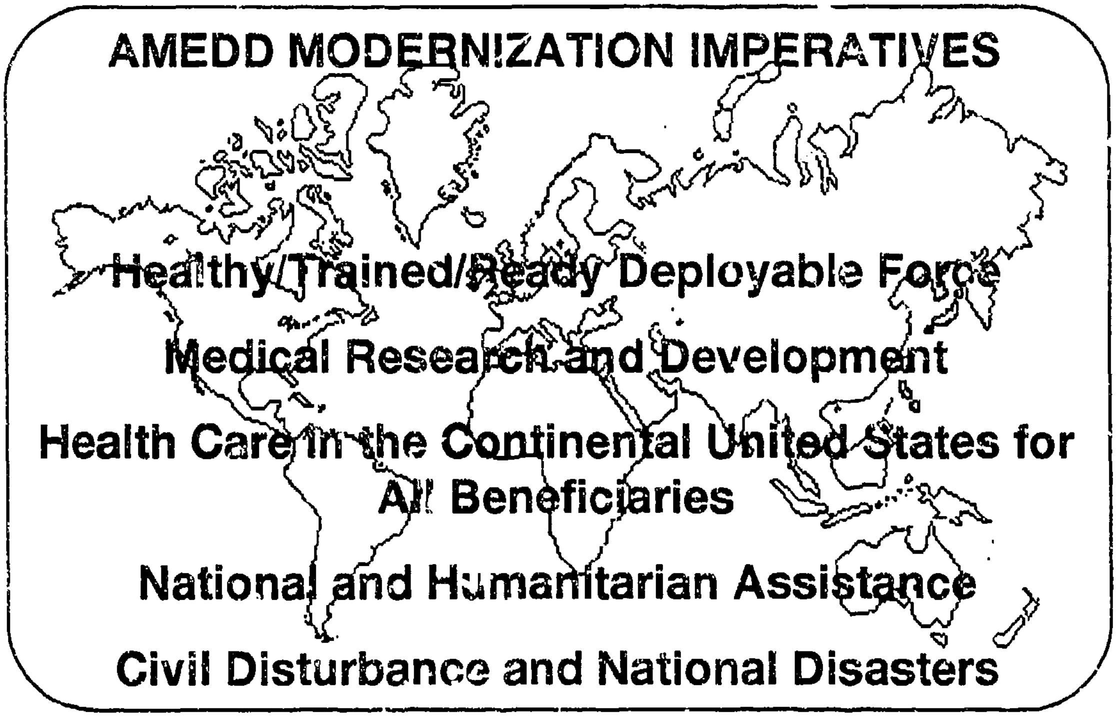


Figure Q-1

The CHSS must provide a healthy force capable of rapid, worldwide deployment, and must be able to protect, project, and sustain the soldier during war and Operations Other Than War (OOTW).

The goals of the CHSS are:

- To reduce the incidence of disease and nonbattle injury through sound preventive health programs;

- To deter the deleterious effects of chemical and biological warfare through immunization and pretreatment;

- To provide medical and surgical treatment for illness and injury;

- To evacuate patients to appropriate medical treatment facilities;

- To sustain military effectiveness under mental and physical stress;

- To sustain soldiers on duty or promptly return to duty those who have recovered; and

- To maintain a robust and aggressive science and technology base to enhance all capabilities related to both health and the delivery of health care.

The CHSS is a seamless continuum of health care from the foxhole to the sustainment base within the continental U.S. This system requires the practice of preventive medicine to sustain the health of the force, as well as the capabilities to deliver far-forward, prompt medical/surgical treatment of life-threatening injuries via standardized modular medical units and organizations throughout the division, corps, and echelons above corps. This system also provides the Standardized Medical Evacuation (MEDEVAC) units with air transport as the primary means of evacuation; responsive, deployable hospitals designed and structured with modules; and enhanced ancillary and functional support systems with standardized modules and state of the art technology. The system must simultaneously provide combat health support to deploying forces; provide health services within the continental U.S.; establish a medical support system within emerging theaters of operation; and later, provide combat health support in postcrisis/war reconstitution, redeployment, and demobilization phases of military operations. Equally important, the system must provide health support during Operations Other Than War; e.g., disaster relief, assistance to foreign nations, support to domestic civilian authorities, and peacekeeping and peace-enforcement activities.

The array of CHSS organizations and services in theater is contingent upon the number of ground forces deployed. Further, the System is tailored in consonance with the joint planning responsibilities to sister Services and to host nations. Medical organizations must synchronize and coordinate their capabilities in order to sustain and man the force. Advanced technology and assured communications are essential for success of the CHSS; these reduce mortality and morbidity rates and increase battlefield survivability. These characteristics of the CHSS, appropriately modernized, assure the delivery of the best medical care in the world to our soldiers.

SECTION 2

WARFIGHTING CONCEPT

The warfighting concept is the foundation of CHSS doctrine and the organizational designs required to support a U.S.-based force projection Army. This concept fully supports the AMEDD battlefield rules shown in Figure Q-2.

Battlefield Rules (Order of Precedence)	
1	Maintain medical presence with soldier
2	Maintain health of command
3	Save lives
4	Clear battlefield
5	Provide state of the art care
6	Ensure early return to duty

Figure Q-2

These rules provide the basis for medical support to conserve the fighting strength and thus assist the Army in achieving its warfighting goals. Medical soldiers deploy with combat forces and employ state of the art medical care to maintain the health of soldiers and save lives on the battlefield. The AMEDD maximizes the use of Active and Reserve Component assets, both of which are capable of rapid expansion, to respond to myriad contingencies. Both components function well in joint and multinational operations. They are equally committed to preserving the health of our fighting forces and all eligible beneficiaries during war and peace.

Threat

The economic power and influence of developing and newly industrialized nations will continue to grow. Centers of power, both global and regional, cannot be measured solely in military terms. Nations will pursue their own political, ideological, and economic interests and may become engaged in direct or indirect competition and conflict with the U.S. More nations have acquired significant numbers of modern, lethal, combat weapon systems; developed very capable armed forces; and become more assertive in international affairs. Political, economic, and social instability, as well as religious, cultural, and economic competition, may eventually erode the influence of the U.S. and/or the influence of traditional regional powers over their neighbors. The emergence of political will and economic strength may encourage less well-developed nations or nonstate entities to develop or acquire modern military weapons (including

nuclear, biological, and chemical weapons). Such conditions significantly raise the potential of internal conflict and armed confrontations in developing regions of the world.

The AMEDD views the threat from two perspectives. The first view is similar to that of the Army; that is, the enemy's capability to disrupt combat health support operations on the battlefield. The second perspective stems from the AMEDD's responsibility to anticipate and prevent, as much as possible, the degradation of soldiers' health and performance due to environmental hazards and military capabilities. This is called the "medical threat." Weapons and environmental conditions that generate casualties beyond the CHSS's capability to provide timely medical care from available resources are considered significant medical threats, for such conditions can produce qualitatively different wound or disease processes. Elements of medical threat are listed in Figure Q-3.

Elements of Medical Threat	
Naturally occurring infectious diseases (endemic diseases)	Environmental extremes and occupational hazards
Battle injuries	Biological warfare
Chemical warfare	Directed energy weapons
Blast effect munitions	Combat stress and sustained operations
Flame and incendiary weapons	Nuclear weapons

Figure Q-3

Medical Capabilities

Combat health support organizations provide a seamless continuum of care from a soldier's point of disease/injury to the sustainment base. This system comprises integrated medical functional areas which provide health care in war and in Operations Other Than War. These functional areas consist of modularly designed organizations with the capability of being task organized and employed in incremental packages. This enables medical planners and commanders to establish a medical system that provides continuous medical management throughout all levels of care and evacuation. Medical organizations, arrayed across the battlefield, provide progressive levels of health care capabilities. More, and better, capabilities are needed. The capability afforded by advanced medical diagnostic communications for combat casualty care in the future will likewise afford soldiers state of the art medical treatment despite the absence or shortage of medical experts on the battlefield or in remote areas.

To support the combat health support concept from the combat health support perspective, the following prioritized operational capabilities must be addressed.

Treatment of Battlefield Wounds, Injuries, and Diseases

Rapid location and acquisition of casualties, combined with prompt, effective resuscitation and early surgical management, reduce killed in action and died of wounds rates. Improved methods of physiologic resuscitation, improved diagnostic and treatment capabilities at unit level and area level treatment facilities, and enhanced enroute medical care during evacuation reduce lost duty time for minor illnesses/infectious diseases. There is a need to evaluate the impact of ocular laser exposure and strategies to minimize the performance degradation from such injuries as well as devices designed to protect against laser effects on the eyes. Integration of advanced medical diagnostic communications for combat casualty care and automated medical records will reduce mortality and morbidity.

Patient Evacuation

The AMEDD must provide a seamless MEDEVAC system throughout the operational spectrum, including Operations Other Than War, combat search and rescue, and shore to ship MEDEVAC. Ground and air evacuation platforms must provide continuous MEDEVAC support in all environmental conditions. Ground and air evacuation platforms must communicate with supported and supporting units as well as with the medical infrastructure, and must have the capabilities to plug into and maintain situational awareness on the digitized battlefield. Medical evacuation organizations must be modular in design. Medical evacuation units must also provide state of the art medical care compatible with the medical structure on the battlefield, and must provide aviation medicine support to attached units. Ground and air evacuation platforms require increased patient transport capacity plus enhanced enroute monitoring and treatment capability through the integration of advanced medical diagnostic communications for combat casualty care.

Preventive Medicine

The preventive medicine system must improve soldier sustainability through the prevention of endemic disease or injury from environmental, occupational, and biological and chemical warfare agent hazards. The preventive medicine system must be modular in design to provide a comprehensive support package adaptable to a continuum of operations. It must conduct disease surveillance from the forward line of troops to the continental U.S. using state of the art automation and communication systems to produce a real time, tactically significant disease profile. Preventive medicine must provide versatile, mobile, and enhanced disease vector control support to reduce vector-borne diseases in a theater of operations. Finally, it must provide rapid and comprehensive environmental monitoring to assess acute and chronic health risks encountered during military operations.

Far-forward Surgical Support

The requirement to project surgery forward increases as a result of the extended battlefield. Highly mobile forward surgical teams are required to perform urgent resuscitative surgery for casualties who require surgical stabilization prior to further evacuation. Forward surgical teams require improved shelter systems that allow strategic deployability and quick set up and a rapid response surgical capability under environmentally-controlled conditions. Forward surgical teams require future technology insertion, including advanced medical diagnostic communications for combat casualty care and assured communications.

Advanced Medical Diagnostic Communications for Combat Casualty Care

Health care personnel at all echelons must be able to communicate with one another by audio, video, and other forms of electronic media. This provides maximum use of expert consultant skills, diagnostic capabilities, and treatment regimens, and improves the speed of implementing state of the art resuscitation (limited by the environment), care, and evacuation. Integrating existing and emerging information technologies into the patient care system, beginning with the individual soldier and continuing throughout the health care continuum, allows the AMEDD to project expert preventive medicine and treatment, thus improving the sustainability of the future force. In addition, health care in Operations Other Than War is enhanced via these technological innovations interconnected by a comprehensive communication network.

Combat Health Logistics System and Blood Management

The Combat Health Logistics System must be modular to provide the necessary flexibility, mobility, and increased capabilities required to support a force projection Army. The system must be anticipatory and project its support to multiple locations through split-based operations. Division level Class VIII support includes receipt, storage, processing, disposal, and distribution of medical materiel; unit level medical maintenance; throughput of blood products; and single/multivision optical fabrication and repair. Corps and echelons above corps support includes receipt, storage, processing, contracting, disposal, and distribution of medical materiel; unit and direct support/general support level medical maintenance; blood distribution and the limited capability to collect blood; single and multivision optical fabrication and repair; medical gas production and distribution; and the building of medical assemblages/resupply packages. The Combat Health Logistics System must centrally manage critical Class VIII items, patient movement equipment, blood products, medical maintenance, and Class VIII contracting. It must coordinate logistics and transportation support with non-medical logistics organizations for all medical logistics activities within areas of operations. It must support reception operations for prepositioned afloat medical materiel at ports of debarkation.

The Combat Health Logistics System must employ state of the art, standardized medical logistics information management and communication systems to facilitate total

asset and in transit visibility, automated transmission of optical fabrication requests, management of blood and blood products, management of medical equipment readiness, and management of captured enemy medical materiel and equipment. These systems must be compatible with, and connected to, all services to accomplish the single integrated medical logistics management mission of the AMEDD.

Battlefield Hospitalization

Hospital care must be provided to all classes of patients across the operational continuum, including the unique medical aspects of Operations Other Than War. Inpatient medical and surgical services plus outpatient clinic and consultant services on an area support basis are required. These services must be based on task organization to support rapid incremental deployment and split-based operations. Electronic transmission of medical records and other information, both externally and internally, is essential. The requirement exists for state of the art health care systems to interface with all echelons of care, including fixed medical treatment facilities within the CONUS. Continued development is required to reduce the weight, cube, and logistic requirements of Tables of Organization and Equipment (TOE) hospitals.

Medical Command, Control, Communications, Computers, and Intelligence (C4I)

The requirement to provide a strategically deployable, seamless, integrated, state of the art system of combat health support in support of joint and multinational forces, across the entire operational continuum (including Operations Other Than War) and in split-based operations, on a continual operational basis, means the system must have appropriate and adequate C4I capabilities. Further, this system requires combat health support staff representation at all Army command levels. Finally, C4I must allow horizontal technology insertion into all organizational designs, including advanced medical diagnostic communications for combat casualty care.

Medical Laboratory Support

Medical laboratory capabilities must be modular in design and retain the adaptability and flexibility necessary to support split-based operations, Operations Other Than War, and force projection. Combat health support within the division requires some laboratory capabilities, including analytical procedures and blood products, in support of disease diagnosis, patient monitoring, and surgical resuscitation. At corps and echelons above corps, laboratory support is by necessity more extensive and must provide appropriate capabilities to prevent or minimize the effects of endemic diseases (including sexually transmitted diseases), hemorrhage, injury, and the medical effects of weapon systems.

The Area Medical Laboratory is an independent laboratory with capabilities to identify and evaluate health hazards, within an area of operation, through the use of unique medical laboratory analyses and rapid assessments of endemic diseases, environmental and occupational health threats, and biological/chemical warfare agents.

The Area Medical Laboratory's analytical, investigative, and consultative capabilities must provide responsive medical assessment and field confirmation of medical threats, infectious agents, and other hazardous substances. The medical laboratory support system must exploit state of the art science and technology to provide a tailored package of analytical capabilities in a multidisciplined array of services and professional consultations to sustain the health of our forces.

Provision of Combat Health Support in a Biological/Chemical Environment

The hospital system must be capable of operating in biologically and chemically contaminated environments. The biological/chemical environment inhibits markedly our combat health support operations, seriously degrading the ability to triage, diagnose, and treat casualties while in current protective equipment. Further, contamination renders medical equipment and supplies unusable. Collective protection shelters can reverse or ameliorate such adverse conditions, and must be available to provide protection to patients, hospital staff, and medical equipment. Decontamination of patients by current methods is slow, labor intensive, and may aggravate injuries, all of which reduce the quality of care.

Dental Services

Dental units must provide oral health care across the operational continuum, including Operations Other Than War. They must ensure soldiers have the highest possible level of dental fitness, and they must prepare soldiers for deployment. Dental units must be modular in design for task organization, strategic deployability, tactical mobility, seamless split-based operations, and deployment as functional emulative increments. Far-forward and adequate care is required to ensure rapid return to duty (vice evacuation). Dental units augment medical assets during combat and mass casualty situations. Dental corps officers and noncommissioned officers provide technical supervision, planning, and training guidance for dental assets located in the medical command, medical brigade, and medical group in peacetime and during all phases of military operations. Dental units require state of the art communication, information management, and computer systems. The leader development process must be sustained.

Combat Stress Control

Combat stress control operational capabilities require far-forward prevention of, and early intervention treatment for, combat stress throughout the continuum of operations. Prevention of stress-induced error, disability, and misconduct, during and after war and Operations Other Than War, requires ongoing command consultation, company level stress monitoring and unit debriefings, and immediate far-forward intervention and treatment of stress cases. Combat stress control organic to divisions/brigades and corps level area medical support require tactical mobility, telecommunications, and advanced biofeedback capability. Effective combat stress control requires that Army stress control activities be conducted routinely with

supported units in training and in garrison, including assistance to unit family support groups.

Veterinary Services

The Army Veterinary Corps is the Department of Defense executive agent for all theater level veterinary services and support. Comprehensive veterinary medical and surgical programs are required to maintain the health of Government animals. Training of animal handlers, plus assessment, prevention, and control of militarily significant animal disease (zoonotic) threats are necessary attributes of a thorough veterinary preventive medicine program. The treatment of Government animals for biological and chemical injuries requires comprehensive monitoring and diagnosis. Veterinary inspections of subsistence at points of origin, Department of Defense (DoD) operational rations, commercial food, water, and ice establishments, and surveillance of biologically/chemically contaminated subsistence are required throughout areas under the cognizance of the CHSS.

Summary

The warfighting operational requirements highlighted here require solutions involving doctrine, training, leader development, organization, and materiel (science and technology). Since the thrust of the Army Modernization Plan is materiel, Figure Q-4 depicts the crosswalk among the Army modernization objectives, the operational capability requirements of CHSS, and the science and technology areas of CHSS that will produce future materiel remedies. The information in Figure Q-4 is amplified in Sections 3 and 4; they focus on current force assessments and projected programs of the AMEDD's operational capability requirements.

AMEDD Prioritization Crosswalk		
Modernization Objective	**Operational Capability Requirement**	**Science and Technology Areas**
Project and sustain	Treatment of battlefield wounds, injuries, and diseases	Combat casualty care, infectious diseases, advanced medical diagnostic communications for combat casualty care, soldier protection, sustainment, and enhancement
Project and sustain/ protect the force	Patient evacuation	Combat casualty care, evacuation platforms, soldier protection, sustainment, and enhancement
Project and sustain/ protect the force	Preventive medicine	Infectious diseases, medical biological defense, medical chemical defense, soldier protection, sustainment, and enhancement
Project and sustain	Far-forward surgical support	Advanced medical diagnostic communications for combat casualty care, combat casualty care, improved shelter systems for all environments
Project and sustain/ protect the force	Advanced medical diagnostic communications for combat casualty care	Assured communication, combat casualty care, immediate position locators, distant physiologic monitoring
Project and sustain	Combat Health Logistics System and blood management	Combat casualty care, assured communication
Project and sustain	Battlefield hospitalization	Combat casualty care
Project and sustain	Medical command, control, communications, computers, and intelligence	Assured communication, advanced medical diagnostic communications for combat casualty care, soldier protection, sustainment, and enhancement
Project and sustain/ protect the force	Medical laboratory support	Infectious diseases, medical biological defense, medical chemical defense
Project and sustain/ protect the force	Provision of combat health support in a biological/ chemical environment	Chemically/biologically protected DEPMEDS, chemical/biological protection system, manage casualty
Project and sustain/ protect the force	Dental services	Combat casualty care
Project and sustain/ protect the force	Combat stress control	Soldier protection, sustainment, and enhancement
Project and sustain/ protect the force	Veterinary services	Infectious diseases, medical biological defense, medical chemical defense

Figure Q-4

SECTION 3

CURRENT PROGRAM ASSESSMENT

Assessment Criteria

An assessment of CHSS capabilities as they support Force Package 1 requirements is depicted in Figure Q-5. The parameters of the analysis were constrained to address battlefield needs in doctrine, training, leader development, organizations, and materiel (science and technology). The assessment was further constrained to enhancements or requirements essential to health care on the battlefield. Capability assessments are categorized as near-term (FY 95-96), mid-term (FY 97-00), and far-term (FY 01-09) and are rated:

RED - No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER - A limited capability or quantity exists to perform the mission; and,

GREEN - Adequate capability and quantity exists to perform the mission.

Current Force Assessment

Treatment of Battlefield Wounds, Injuries, and Diseases

The combat lifesaver program has already improved early casualty care, but it requires continued emphasis to ensure viability. Currently, there are no resuscitative oxygen-providing fluids far-forward to treat profound shock in hemorrhagic casualties; this deficiency equates to high mortality. Moreover, immediate trauma treatment suffers due to insufficient medical sustainment training of combat medics, insufficient quantities of training packages, and the limited number of medical corps officers with both training and experience at the brigade level. Levels I and II facilities lack diagnostic capabilities, sufficient medical provider training, and access to medical intelligence about the area of operations. Continued research is required to fully characterize cellular and organ effects of exposure to directed energy, including laser, microwave, and particle beam. Current paper medical records are frequently incomplete, lost, or unavailable when required. Thus, essential medical information about deploying soldiers is frequently not available. Also, a complete doctrine on combat health support in Operations Other Than War and joint/multinational operations is not available. Finally, communications capabilities are inadequate; they are neither sufficient nor compatible.

Combat Health Support System Capabilities				
Modernization Objective	**Operational Capability Requirement**	**Near-Term (FY 95-96)**	**Mid-Term (FY 97-00)**	**Far-Term (FY 01-09)**
Project and sustain	Treatment of battlefield wounds, injuries, and diseases	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Patient evacuation	AMBER	AMBER	RED
Project and sustain/ protect the force	Preventive medicine Infectious diseases/environmental injury/occupational hazards Develop biological/chemical agent preventive measures Biological Chemical	 AMBER RED AMBER	 AMBER RED AMBER	 AMBER AMBER AMBER
Project and sustain	Far-forward surgical support	AMBER	AMBER	GREEN
Project and sustain/ protect the force	Advanced medical diagnostic communications for combat casualty care	RED	RED	RED
Project and sustain	Combat Health Logistics System and blood management	AMBER	AMBER	AMBER
Project and sustain	Battlefield hospitalization	AMBER	AMBER	AMBER
Project and sustain	Medical command, control, communications, computers, and intelligence	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Medical laboratory support	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Provision of combat health support in a biological/chemical environment	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Dental services	AMBER	AMBER	GREEN
Project and sustain/ protect the force	Combat stress control	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Veterinary services	AMBER	AMBER	AMBER

Figure Q-5

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is **AMBER** in the near-, mid-, and far-terms due to the following reasons: inadequate capabilities to rapidly locate casualties; inadequate proficiency training; inadequate medical corps leader development and training; lack of voice and data communications and integration of technologies associated with advanced medical diagnostic communications for combat casualty care; inadequate technological advances applied to protection and treatment of directed energy injuries; and insufficient diagnostic and resuscitative capabilities at Levels I and II.

Patient Evacuation

Limited resources currently exist to provide ground and air evacuation to forces. However, this capability is quickly eroding as the evacuation fleet becomes outdated and loses its ability to keep pace with combat units. The majority of the current aeromedical evacuation fleet consists of UH-1V helicopters, which are quickly becoming outdated and over-aged.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **RED**

Rationale: This capability is **AMBER** in the near- to mid-terms due to the limited capabilities of the current evacuation fleet. Changes to organizational design may occur in the mid-term; however, these changes will not affect the **AMBER** rating. Evacuation is **RED** in the far-term due to lack of funding to modernize both the ground and air evacuation fleets.

Preventive Medicine

Infectious Diseases/Environmental Injury/Occupational Hazards

The existing preventive medicine system does not contain standardized, comprehensive surveillance systems to identify health threats rapidly enough to provide warfighters with tactically useful information. The current preventive medicine force is not organized in a modular fashion to allow for incremental deployment into an area of operations. Testing equipment is limited in scope. Vector surveillance and control equipment is cumbersome and requires excessive airframe space.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is **AMBER** in the near-, mid-, and far-terms due to limited standardized automated disease and injury surveillance programs. Organizational redesign into modules provides only a limited increase in unit capabilities.

Development of Biological/Chemical Agent Preventive Measures

The only field chemical agent pretreatment is pyridostigmine bromide, a nerve agent pretreatment. No effective prophylactic currently exists for other chemical intoxicants, although research into antipenetrants and globulins continues. Radiation antiemesis drugs are currently being investigated. Vaccines against validated biological threat agents have been or are being developed.

Extensive testing to ensure product safety and efficacy (to satisfy Food and Drug Administration (FDA) regulations) impedes the rapid fielding of vaccines and

prophylactics, allowing at best only contingency stockage. Current vaccines in production are effective against very few potential biological warfare agents.

Biological

Near-term: **RED** Mid-term: **RED** Far-term: **AMBER**

Rationale: Biological defense is **RED** in the near- and mid-terms because vaccine production for protection against biological threat agents is in an early stage. FDA approval is a lengthy process. Pretreatment drugs are available in limited quantities only. Medical defense against known threats requires further research; bioengineering may produce new threats.

Chemical

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: Chemical defense is **AMBER** in the near-, mid-, and far-terms because we have limited drugs to protect the fighting force from the effects of chemical agents. There are promising breakthroughs, however, with respect to both protectant/treatment drugs and topical skin protectants.

Far-forward Surgical Support

Far-forward Surgical Support is essential to resuscitating and stabilizing wounded soldiers. Current medical organizations possess neither the lightweight equipment required for strategic deployment nor the treatment capability needed to provide initial stabilizing wound surgery as far-forward as possible. The concept and design of the forward surgical team (Total Army Analysis 2003) were approved by the Army Chief of Staff. TOE actions were approved by the U.S. Army Training and Doctrine Command (TRADOC) and are pending Department of the Army approval. Shelter requirements are completed, and the chemical/biological protection system will meet forward surgical team requirements. Currently, no capability exists for advanced medical diagnostic communications for combat casualty care among forward surgical teams and hospitals in theater or within the continental U.S.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **GREEN**

Rationale: Far-forward surgery is **AMBER** in the near- and mid-terms because it is limited in quantity and capability. Force structure actions and adequate shelter design improve the availability of far-forward surgical support in the far-term.

Advanced Medical Diagnostic Communications for Combat Casualty Care

Currently, the only capability that exists is off-the-shelf prototype equipment in extremely limited numbers capable of supporting Operations Other Than War.

Near-term: **RED** Mid-term: **RED** Far-term: **RED**

Rationale: This capability is **RED** in the near-, mid-, and far-terms because resourcing remains unresolved.

Combat Health Logistics System and Blood Management

The Combat Health Logistics System lacks the modularity, flexibility, versatility, and increased capabilities required to better support a force projection Army. Combat Health Logistics System units do not have the real time automation and communication capabilities necessary to establish inter/intratheater links between medical logistics providers and users. The hardware and software capable of joint compatibility and connectivity required for a single integrated medical logistics management system are not available. The quantity and types of materiel handling equipment, plus the distribution system itself, do not properly support Army, joint, and multinational forces across the range of operations. Combat Health Logistics System units lack environmentally controlled and chemically protected shelter systems and containers.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This required capability is **AMBER** in the near-, mid-, and far-terms because the medical logistics structure is not sufficiently modular, flexible, or versatile to provide mission-tailorable Class VIII support. Real time automation/communication capabilities necessary to establish inter/intratheater links between medical logistics providers and users are not available. There are no hardware and software capable of the joint compatibility and connectivity required for the single, integrated medical logistics management system.

The lack of total asset and in transit visibility severely hampers the materiel management effectiveness of the Combat Health Logistics System. Medical logistics battalions lack advanced cargo handling systems needed to distribute preconfigured resupply packages. Other shortfalls that degrade medical logistics include: reliance on transportation assets to support unit distribution; lack of authorized global positioning system equipment; nonexistent blood substitutes (which reduce dependency on packed red blood cells and the special handling requirements); and, lack of standard bar-code reading systems for support operations.

Battlefield Hospitalization

The weight and cube of current transportable medical treatment facilities consume significant strategic lift assets, and virtually preclude rapid deployment and

tactical mobility of hospital structure to and within areas of operation. With the early deployment and use of forward surgical teams, the requirement for early deployment of hospitals into areas of operations is crucial. Absent such capabilities, battlefield wounds and injuries may be subject to evacuation delays and require lengthy stabilizing surgery in hospitals. These hospitals are not designed to support the varied missions associated with Operations Other Than War and the populations that most certainly will be encountered.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is **AMBER** in the near-, mid-, and far-terms because state of the art health care requires increasing amounts of high technology medical equipment housed in controlled environments. High technology surgical and x-ray equipment increases cost, weight, and maintenance requirements. Rapid developments in physiologic, intensive care monitoring of the patient provide earliest warning of impending complications but require additional staff and increased space per patient. Rapid technological changes require constant changes in equipment, medications (such as new antibiotics), and shelter systems. Many of these factors adversely impact rapid strategic deployability and tactical mobility.

Medical Command, Control, Communications, Computers, and Intelligence

Current medical command and control organizational elements, groups, brigades, and medical commands are somewhat redundant in battlefield functions. Current staffing levels of selected medical command and control units are inadequate. Medical command and control units are incapable of split-based operations; they need to be redesigned for modularity. Strategic deployability of these headquarters elements is limited due to weight and cube requirements. These units cannot communicate with all required elements due to a lack of communication and automated data processing equipment.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: The command, control, communications, computers, and intelligence capability is **AMBER** in the near-, mid-, and far-terms due to inadequately assured communications and automated data processing, plus the lack of split-based capability for combat health support command and control elements.

Medical Laboratory Support

The medical laboratory system lacks a deployable capability to provide identification and field confirmation of biological or chemical threat agents. toxins, or other agents of biological origin. The system is inadequately equipped to rapidly diagnose endemic diseases in deployed forces. Microbiology capabilities in current Deployable Medical Systems (DEPMEDS) hospital laboratories do not provide required clinical bacteriology, epidemiology, or disease surveillance data. Analytical

technologies for the identification and assessment of occupational and environmental health hazards are not currently fielded.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: The medical laboratory is **AMBER** in the near-term due to inadequate capabilities to perform the biological/chemical and endemic disease requirements. This rating remains through the mid- and far-terms based on anticipated limitations in the development and transition of technologies that fully satisfy the biological warfare and endemic disease capability requirements for the Army of the early 21st Century.

Provision of Combat Health Support in a Biological/Chemical Environment

Current capabilities do not provide adequate protection without significant degradation in combat effectiveness. The wear and use of protective clothing and equipment often reduce performance and may cause unintended illness or injury. Hospitals subjected to biological/chemical warfare would be incapable of continued performance. Refer to pages Q-32 through Q-34 for the status of the Chemically and Biologically Protected Shelter, and the Chemically Protected DEPMEDS Modernization.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This requirement is **AMBER** in the near-, mid-, and far-terms because of insufficient funding to procure necessary collective protection for Force Package 1 DEPMEDS units. Protective clothing continues to contribute to reductions in performance and can cause unintended illness or injury. Patient decontamination operations can aggravate injuries.

Dental Services

Current dental equipment sets provide the capability to accomplish the mission. However, existing equipment is larger, heavier, and more maintenance-intensive than desirable; examples are dental x-ray equipment and sterilizers. Existing medicated intermediate restorative materiel requires special handling and temperature stability. There is no vaccine to protect soldiers from increased susceptibility to infectious dental diseases in combat environments.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **GREEN**

Rationale: There are insufficient resources available to modernize field dental units in Force Package 1 or to sustain these units once modernized.

Combat Stress Control

Combat stress control modular teams lack communication capability and appropriate medical equipment sets. Some maneuver brigades lack adequate organic

teams. Organization and doctrine do not fully exploit combat stress control unit capabilities in joint force projection and Operations Other Than War. Combat stress control field training lacks necessary emphasis and interaction with supported field units.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: Combat stress control is **AMBER** in the near-, mid-, and far-terms due to the continued lack of communication capabilities, appropriate medical equipment sets, and absence of organizational changes needed to enable combat stress control units to operate effectively in the full range of military operations, including Operations Other Than War.

Veterinary Services

The existing veterinary system was designed to support a forward-deployed North Atlantic Treaty Organization force. Communication capabilities do not allow for split-based operations. Biological and chemical detection and treatment of military animals are inadequate. Current procurement inspections of subsistence at origin are insufficient.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is **AMBER** in the near-, mid-, and far-terms due to the lack of resources to modernize and support the wartime executive agency requirements of the Army Veterinary Corps.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

Individual service men and women are the most important, as well as the most vulnerable, components of military systems and capabilities. They face a daunting array of challenges that degrade health and performance when engaging in military operations. In addition to the risk of injury and death associated with highly lethal weapons, deployment exposes soldiers to incapacitating infectious diseases, environmental injuries, extreme physical and mental fatigue, and other operational stressors.

Medical research provides information and materiel to protect, project and sustain, and treat the armed forces. In peace, medical technology bolsters the confidence of our allies and coalition partners, is a critical element of deterrence to unconventional warfare, and forms the foundation of soldier readiness. It contributes to national and regional stability by enhancing humanitarian assistance, disaster relief, and peacekeeping/peace-building operations. In crisis, medical technology ensures threats to the health of the force do not limit military operations. In war, medical research amplifies combat effectiveness, minimizes casualties, and reduces death and disability rates among those who become casualties.

"The Army we are building is not just a smaller version of the Cold War Army–but a different Army."
General Gordon R. Sullivan
Chief of Staff

The AMEDD's research, development, and acquisition strategy is aligned with the National Military Strategy. It requires rapidly deployable forces with global responsibilities, and mandates those forces to attain swift, decisive victory with minimal casualties. Military medical research, development, and acquisition programs are designed to enhance readiness, increase mission effectiveness, and improve methods of casualty care. Readiness is enhanced by providing vaccines, pretreatment drugs, and preventive medicine guidance, all of which allow soldiers to deploy anywhere in the world despite the threat of infectious diseases, biological/chemical weapons, and harsh climates. Mission effectiveness is increased by reducing the performance degrading effects of stress and fatigue, by eliminating the health hazards of Army systems, and by defining the proper wear of protective clothing and equipment. The mission effectiveness of medical personnel is enhanced by Medical Logistics Management (having the right items in the right place at the right time). Return to duty rates are improved by providing state of the art treatment of casualties. Combat casualty care is improved by reducing the weight and volume, increasing the durability, and enhancing the capabilities of resuscitative and trauma care equipment. This permits life-threatening injuries to be treated far-forward on the battlefield. It also reduces logistical requirements, further improving the mobility and survivability of medical systems.

Medical Technological Superiority

The end of the Cold War dictated substantial changes in defense policies and therefore in military medical research, development, and acquisition. The predictable conventional and nuclear threat posed by the former Soviet Union and Warsaw Pact has been replaced by eccentric threats emanating from numerous state and nonstate entities. The threat of large-scale, technologically sophisticated warfare has been replaced by dangerous threats from new and unstable governments, many with biological and chemical weapons.

Today's Power Projection Army is confronted by a greater potential for regional conflicts, proliferation of weapons of mass destruction, and ample and wide-spread availability of advanced conventional weapons. Moreover, the Army will continue to support Operations Other Than War (OOTW), ranging from continuous, high tempo, peacemaking operations to humanitarian assistance actions. The future threats and the future potential for military operations will be characterized in the same way. Thus, the principal focus of current U.S. military planning is on deterrence and regional crisis response. The AMEDD supports this strategy by focusing on deterring the use of biological and chemical weapons with prophylactic treatment, maximizing the deployability of soldiers by immunization against infectious diseases found in remote regions of the world, preparing soldiers to conduct sustained operations in all physical environments, and developing field-hardened and miniaturized forms of state of the art trauma care equipment.

> *"... in 1950 it was an act of faith to believe that medical research would benefit humanity, ... Vaccines are now used to prevent polio, rubella, measles, and hepatitis. ... just as the medical advances of today are based on past research, the medical advances of the future will be based on the research that precedes it. The Army must prepare now for the future."*
>
> *National Research Council*
> *"Strategic Technologies for the Army of the Twenty-first Century"*

Military medical research, development, and acquisition constitutes a unique national resource focused on supporting the full range of military operations by providing superior capabilities for medical support and services to U.S. armed forces. Unlike other national and international investments in medical science and technology, military medical research is concerned with preserving the combatant's health and optimizing mission capabilities. It must solve problems not addressed by civilian research organizations. Health care delivery in a field environment, far from well-equipped trauma centers, is central to military medicine but is of little relevance to civilian researchers. The development of biological and chemical warfare pretreatment compounds is a unique military requirement. Infectious diseases which are not common in the U.S. (but are prevalent in countries to which soldiers may deploy) are of little interest to civilian researchers. Health hazards generated by Army systems that have no counterpart in industry must be identified by military medical researchers. Moreover, unlike other federal medical research organizations, military medical

research, development, and acquisition is oriented around product development. Basic research in the AMEDD must have obvious programmatic relevance. Science and technology programs are intensively managed to identify candidate solutions to military operational problems. Military medical research efforts are task organized to exploit capabilities rather than to sustain scientific disciplines.

Military Medical Research, Development, and Acquisition Organization

Figure Q-6 illustrates the AMEDD organization for research, development, and acquisition. The functions of product life cycle management from concept to disposal are managed by the U.S. Army Medical Research and Materiel Command (USAMRMC). The AMEDD's science and technology program is executed in six laboratories in the continental U.S. (Figure Q-7). Medical advanced development and acquisition programs are managed by the U.S. Army Medical Materiel Development Activity (USAMMDA) and the U.S. Army Medical Materiel Agency (USAMMA), respectively; both are collocated with USAMRMC at Fort Detrick, Frederick, Maryland.

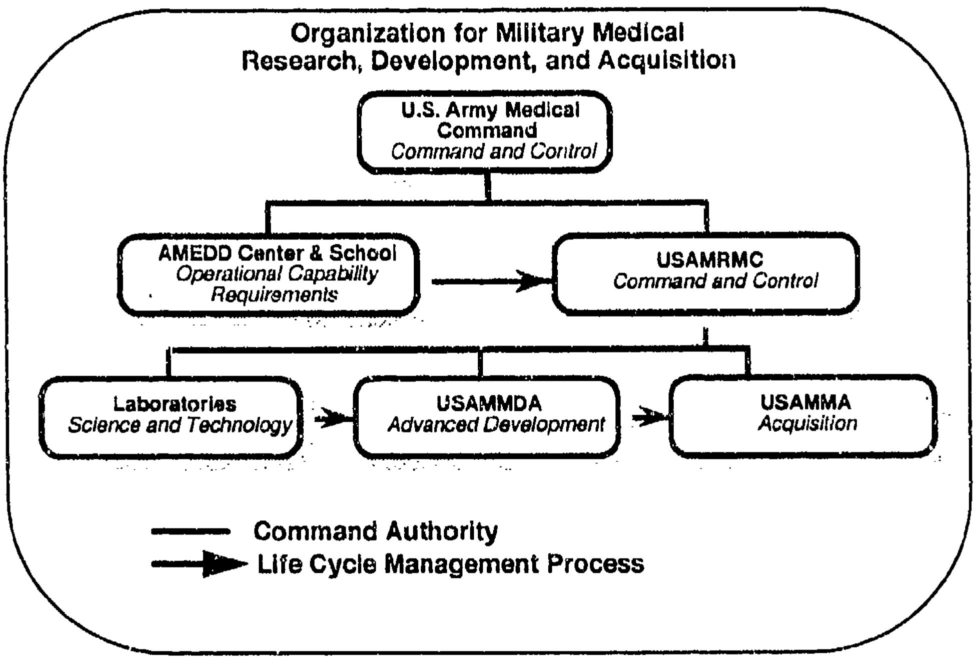


Figure Q-6

USAMRMC Laboratories

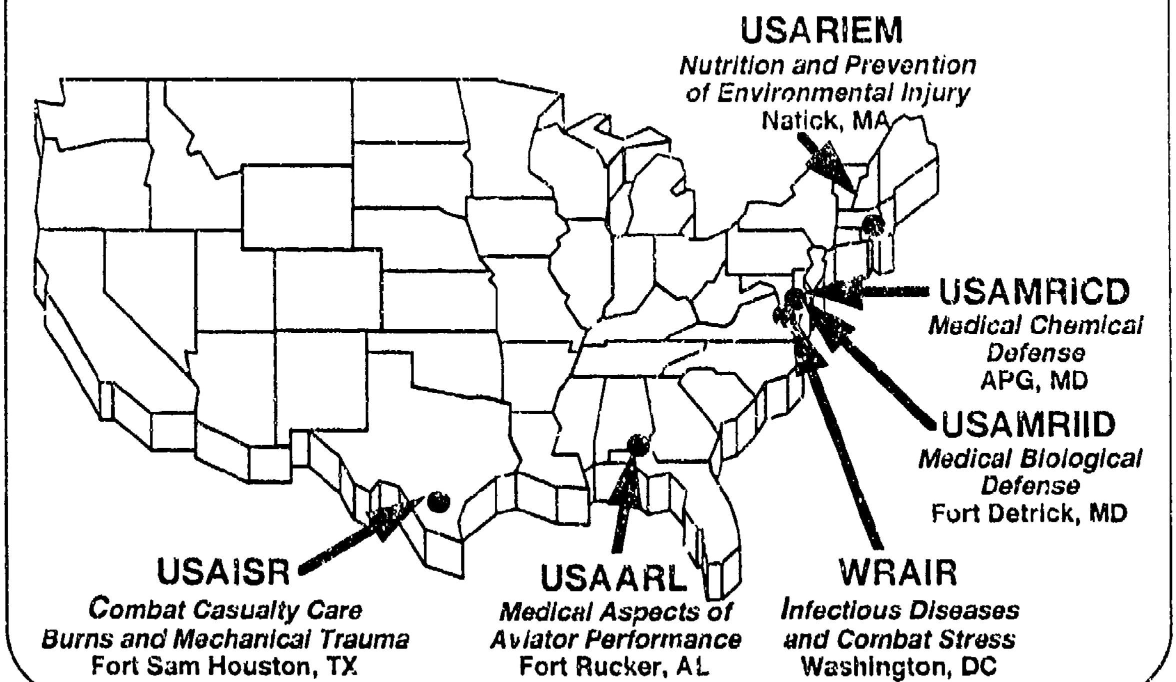


Figure Q-7

Medical Science and Technology

The strategic plan for the Army's medical science and technology program is described in the *Army Science and Technology Master Plan.* The science and technology program is divided into five functional areas. These areas provide comprehensive research programs in infectious diseases, medical/biological/chemical defense, soldier sustainment, and combat casualty care.

Infectious Diseases of Military Significance

The goals of this research program are to protect soldiers from incapacitating, infectious diseases through the development of vaccines and prophylactic drugs, and to return soldiers to duty through the development of effective drug treatment. Infectious diseases pose significant threats to operational effectiveness because most Americans lack natural immunity to diseases endemic abroad. The prevention of epidemic infections in deployed forces is a force multiplier. Immunizations or prophylactic drugs given prior to deployment are the preferred medical countermeasures to infection because they reduce both logistical requirements and personnel turbulence (and thus heighten combat effectiveness) in theaters of operation.

The focus of market-driven pharmaceutical development has been on diseases important to the industrial world. Infections prominent in many strategically significant areas of the world do not receive attention comparable to the size of the populations affected. Thus, fundamental insight into the biology of the infectious organism and human response to infection must be developed through Army-supported research.

Medical Biological Defense

The mission of this research program is to ensure the sustained effectiveness of U.S. armed forces operating in a biological warfare environment. Research efforts focus on evaluating threats and developing countermeasures. Vaccine development has the highest priority because active immunization prior to deployment is the most effective medical countermeasure and serves to deter biological warfare. Specifically, the objectives of this program are to prevent casualties through the use of medical countermeasures (e.g., vaccines, toxoids, and pretreatment drugs); to diagnose exposure to biological warfare agents; and to use antitoxins and therapeutic drugs to treat casualties, prevent lethality, and maximize return to duty.

Medical Chemical Defense

The intent of this research program is to preserve combat effectiveness through the timely application of medical countermeasures in response to chemical warfare defense requirements. This program has three objectives: maintain technological capability to meet present requirements and counter future threats; provide individual level prevention and protection to preserve the fighting strength; and provide medical management of chemical casualties (to enhance survival and timely return to duty). Developing pretreatments, protectants, and antidotes, which do not have performance degrading side effects and are safe and effective, is essential to preserving combat effectiveness.

Soldier Protection, Sustainment, and Enhancement

The goals of this research program are to protect soldiers from health hazards and stresses associated with military operations and to sustain their performance across the spectrum of military operations. The program focuses on those military health hazards and stresses that adversely affect the health of soldiers, and thus their capabilities to complete their missions. Developing strategies to prevent soldier performance degradation requires demonstrating approaches which remain effective when used in combination with each other and in realistic operational tests. Research must provide medically sound, system-safety criteria and exposure standards; methods to prevent environmental injury; nutritional strategies to counter mental and physical fatigue; strategies to reduce operational stress; and devices to quantify soldier effectiveness.

Combat Casualty Care

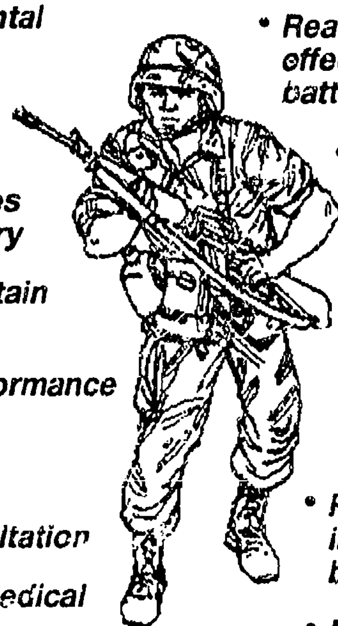
The mission of this research program is to employ basic science and technology to improve methods of, and develop products for, resuscitation, stabilization, evacuation, and treatment of battlefield casualties. The specific objectives are: to enhance the resuscitative management of trauma care far-forward on the battlefield, thereby reducing the high mortality rate; to minimize lost duty time from minor battle and nonbattle injuries; to reduce unnecessary evacuations; and to decrease the resupply requirements of forward echelons of care. There is a critical need to place easy to use, lightweight medical materiel as far-forward on the battlefield as possible. Future devices must apply intelligent systems and virtual reality technologies to triage, diagnosis, and treatment.

Medical Science and Technology Products

The AMEDD science and technology program provides solutions to battle and nonbattle medical threats that influence the development of doctrine, training, leader development, organizations, and materiel; all solutions focus on the soldier. Figure Q-8 shows examples of how future medical technologies will enhance warfighter capabilities.

Future Medical Technologies

- ***Hormones to reduce mental fatigue***
- ***Compounds to enhance memory***
- ***Thermoregulation devices to prevent heat/cold injury***
- ***Immune boosters to sustain health during stress***
- ***Rations to enhance performance***
- ***Training to prevent musculoskeletal injury***
- ***Real time medical consultation***
- ***Miniature noninvasive medical sensors***
- ***Blood substitutes***



- ***Real time soldier effectiveness models for battlefield visualization***
- ***Topical compounds to protect against parasites***
- ***Wound dressings to prevent blood loss and accelerate healing***
- ***Single-dose oral vaccines to prevent infectious disease***
- ***Receptor targeted immunization against biological agents***
- ***Natural antibodies against chemical agents***

Figure Q-8

Products of the medical research, development, and acquisition process include information and materiel. Information products include documents such as preventive medicine guidance for specific countries, environmental exposure guidelines for use by commanders, and health hazard standards for electromagnetic radiation devices. Such documents do not require advanced development research and are thus fielded early in the research, development, and acquisition life cycle. Materiel products include drugs, vaccines, and medical devices. Some medical materiel products are rapidly prototyped and fielded within two to three years. However, vaccines requiring Food and Drug Administration (FDA) licensure may take 10 or more years to progress from basic research to fielding. Figure Q-9 provides a timeline for major AMEDD science and technology initiatives.

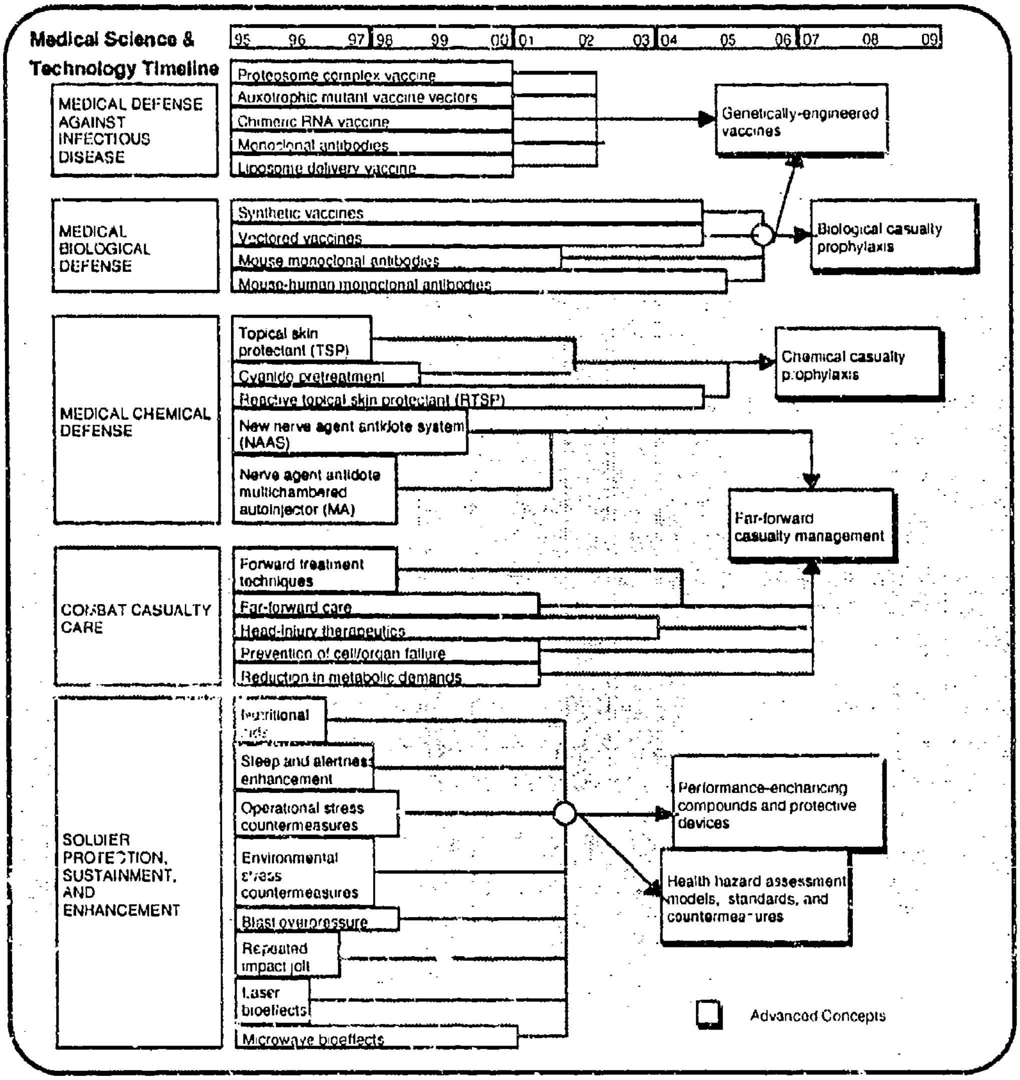


Figure Q-9

Medical Advanced Development

Management of the medical advanced development program is the responsibility of USAMMDA. An advanced development project is initiated when a product or concept is approved for transition from the medical science and technology program and terminates when it is approved for transition to procurement. USAMMDA is organized into three project management divisions: Applied Medical Systems, Biological Systems, and Pharmaceutical Systems. Each division is responsible for all aspects of the acquisition strategy for approved development projects within its functional area, including cost estimates, technical risk assessments, systems analyses, testing and evaluation, value engineering, quality assurance, production planning, and system supportability.

The Applied Medical Systems Division oversees the technical development of medical equipment used by individual soldiers and field medical organizations. Military medical devices must be more rugged, durable, and portable than commercial systems, and must be capable of operation in a biological and chemical warfare environment. All medical devices must meet FDA standards.

The Biological Systems Division develops and tests biologicals designed to protect soldiers against infectious diseases and biological warfare agents. Biological products are developed in accordance with regulations of the FDA, the U.S. Environmental Protection Agency, and the U.S. Department of Agriculture. Development of biological defense vaccines in support of Department of Defense requirements is done in collaboration with the Joint Program Office for Biological Defense.

The Pharmaceutical Systems Division develops drugs, antidotes, drug delivery systems, and decontamination products to counter infectious diseases, protect against biological/chemical warfare agents, and treat combat casualties. All pharmaceuticals must be developed in accordance with FDA standards.

Figures Q-10 through Q-12 list near-term, mid-term and far-term materiel products within each advanced development project management system and science and technology functional area.

Near-term Product Availability (FY 95 - FY 96)

Applied Medical Systems

Infectious Diseases of Military Significance

- Sprayer, Pesticide, Electric, Liquid (SPEL)
- Pesticide Aerosol Generator, Ultra-low Volume, Electric

Combat Casualty Care

- Field Medical Oxygen Generating and Distribution System
- Computed Tomography (CT) Scanner, Field
- X-ray System, Dental, Miniature

Biological Systems

Medical Biological Defense

- Botulism Immune Globulin (Human)

Pharmaceutical Systems

Combat Casualty Care

- Antimicrobial Dermal Dressing

Figure Q-10

Mid-term Product Availability (FY 97 - FY 00)

Applied Medical Systems

Combat Casualty Care

- Field Anesthesia Machine
- Armored Ambulance Suite
- Liquid Oxygen Generation, Production, and Distribution System

Biological Systems

Infectious Diseases of Military Significance

- Argentine Hemorrhagic Fever Live Vaccine
- Hepatitis A Vaccine (Inactivated)
- Whole Cell Plus B Subunit Cholera Vaccine (ETEC Indication)
- Whole Cell Plus B Subunit Cholera Vaccine
- ETEC Whole Cell, Recombinant B Subunit Vaccine
- Shigella Vaccine, *E. coli* Vectored *S. flexneri*
- Tick-borne Encephalitis Vaccine

Medical Biological Defense

- Tularemia Live Vaccine
- Q Fever, CMR Extract, Vaccine

Pharmaceutical Systems

Medical Chemical Defense

- Topical Skin Protectant
- Nerve Agent Antidote, Multichambered Autoinjector

Combat Casualty Care

- Hypertonic Saline Dextran

Figure Q-11

Far-term Product Availability
(FY 01 - FY 09)

Applied Medical Systems

Combat Casualty Care

- Thawed Blood Processing System

Biological Systems

Infectious Diseases of Military Significance

- Insect/Arthropod Repellent Lotion
- Plasmodium Falciparum Blood Stage Malaria Vaccine
- Campylobacter Vaccine
- Chikungunya Live Vaccine
- Rift Valley Fever Live Vaccine
- Detoxified LPS-OMP Meningococcal Group B Vaccine
- Hantaan M-S (Vaccinia-vectored) Vaccine

Medical Biological Defense

- Botulinum Toxoid ~ pe F
- Botulinum Toxoid, pe G
- Botulinum Polyvalent Toxoid, Pentavalent (A-E)
- Botulinum Immune Globulin F(ab')2 Heptavalent (Equine)
- Staphylococcal Enterotoxin B Toxoid, Microencapsulated
- Cell Culture Derived Smallpox Vaccine (Vaccinia)
- Ricin Toxoid

Pharmaceutical Systems

Infectious Diseases of Military Significance

- Antileishmanial Drug, WR6026
- Antimalarial Drug, WR238,605
- Antimalarial Drug, Halofantrine, Prophylactic
- Antimalarial Drug, Azithromycin
- Antimalarial Drug, Arteether
- Schistosome Topical Antipenetrant

Medical Chemical Defense

- Nerve Agent Antidote, HI-6
- Cyanide Pretreatment

Combat Casualty Care

- Microencapsulated Antibiotic, Ampic Dental
- Micro- -sulated Antibiotic, Cepha... -orin
- Silver Nylon Burn Dressing

Figure Q-12

Medical Materiel Acquisition and Logistics

USAMMA is responsible for medical materiel acquisition and logistics. Its Materiel Acquisition Directorate is the primary interface between developmental and logistical requirements. Three other USAMMA directorates–Maintenance, Engineering, and Support; Operations and Support; and Readiness Support--provide the full range of logistical expertise and technical assistance required to ensure that developed items are fully supportable in the field.

The Materiel Acquisition Directorate becomes involved early in the developmental process through the Integrated Logistics Element review. Actions such as maintenance supportability, cataloging and documentation, transportability, etc., are reviewed for levels of completion/support and risk. After an item attains an approved Milestone III decision, it is transitioned to USAMMA for procurement, fielding, sustainment, and eventual disposal. USAMMA is involved from the beginning in the programming of funds, completion of Basis of Issue plans and other authorization documents, and coordination with customer Major Commands for effective fielding dates. To complete the final step in the acquisition of new medical materiel, USAMMA verifies operational and sustainment capabilities with sample data collection on fielded

systems. This user feedback system produces timely modifications, product redesigns, or technology upgrade insertions as needed.

Current acquisition projects in the field medical systems line include Deployable Medical Systems (DEPMEDS), the Army Medical Laboratory, and forward surgical teams.

DEPMEDS constitutes the AMEDD's field medical hospital equipping and modernization project. A total of 84 hospitals is to be fielded under this critical readiness effort. Fielding is to be completed in FY 95; the project then moves into the sustainment and incremental modernization phase. A depot refurbishment program has been initiated and is funded in the Program Objective Memorandum to provide centralized sustainment management for the materiel.

Sustainment will also be augmented through the procurement and storage of potency and dated push packages to support early deploying units. Modernization items such as Computerized Tomography (CT) scanners, air-transportable defibrillators, internal voice, data communications networks, and oxygen generation and distribution systems are programmed as technology insertions to maintain state of the art health care on the battlefield.

The Army medical laboratory brings a new capability to diagnose endemic diseases, biological/chemical warfare agents, and radiobiological/environmental/occupational health hazards within a theater of operations, thereby enhancing both the treatment and prevention of these hazards. This multifunctional organization uses highly complex laboratory equipment, such as mass spectrophotometers and gas chromatographies, and functions within a deployable shelter environment. Fielding is scheduled to begin in FY 95.

The forward surgical team fulfills the AMEDD's need to have a highly mobile, surgical-intensive organization operating within brigade and division areas of operations. The forward surgical team provides more responsive resuscitative care with significant improvements in evacuation capabilities. The forward surgical team features reduced weight and cube, increased deployability, and enhanced transportability/mobility. New items, such as oxygen concentrators, draw-over anesthesia apparatuses, and soft-wall (tent) sheltering systems, are incorporated in this new organization. Fielding is scheduled to begin in FY 96.

Medical Modernization Issues

The combat medic relies on many systems developed by non-AMEDD materiel developers. They are highlighted here to provide a more complete picture of the scope of medical modernization initiatives.

Medical Evacuation

A primary near-term medical modernization issue for the Army is the modernization of the MEDEVAC system via:

- Communications improvements for command and control, medical regulating, transfer of medical information, and situational awareness;

- Navigation improvements to increase the presence of medical personnel among soldiers and to improve capabilities to locate casualties; and

- Treatment platform advances to ensure the best possible enroute medical care on the extended battlefield.

The MEDEVAC helicopter, the armored ambulance, and the upgrade to the armored battalion aid station provide MEDEVAC and treatment of the sick and wounded; transportation of medical equipment, supplies, and personnel; and combat rescue.

The UH-60Q MEDEVAC helicopter (Figure Q-13), in combination with a developing concept for a High Capacity Air Ambulance provides Army medical personnel projection, sustainment, protection, and maneuver capabilities. Enhancements over the current systems include:

- Communications equipment: a data bus allows integration of systems that provide situational awareness and communications within digital networks on the future battlefield. This facilitates mission acquisition, patient care and regulation, survivability, and command and control;

- Navigation equipment: adds the ability to support maneuver forces at night and in adverse weather where precise navigation systems and forward looking infrared will allow first-pass identification and recovery of casualties which enhance the survivability of the aircraft and crew;

- Medical equipment: adds the ability to sustain casualties over longer evacuation routes and provides for integration of medical data collection and transmission; and

Total system: improves the medical operational tempo, as a consequence of reduced hospital relocations, and enhances medical resupply capabilities.

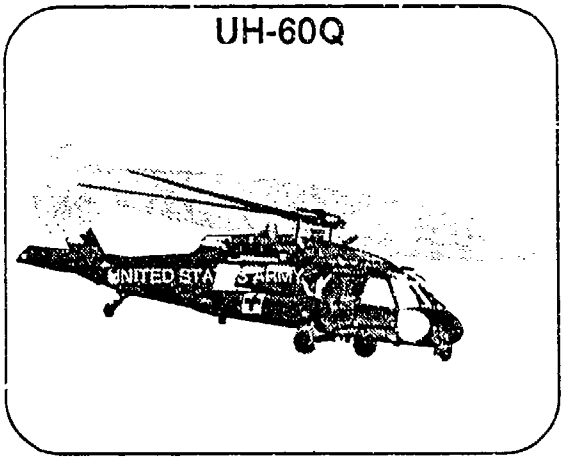


Figure Q-13

The modernized Armored Ambulance (Figure Q-14) and Armored Battalion Aid Station (Figure Q-15) project and sustain the force through:

- Improved automotive, electrical, communications, interior design, environmental support, and machine/soldier interface;
- Increased rate of speed (allowing mobility equal to supported forces);
- Enhanced enroute medical care during tactical MEDEVACs; and
- Decreased mortality and morbidity due to faster evacuation.

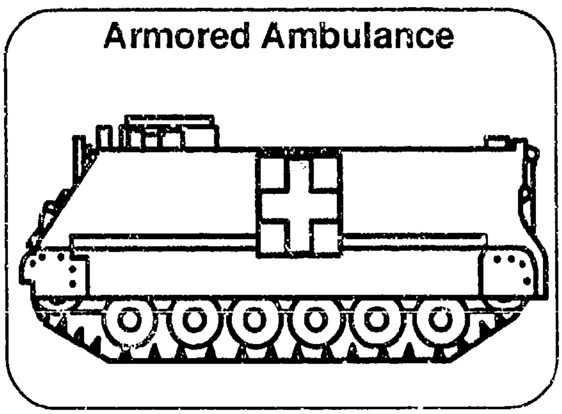


Figure Q-14

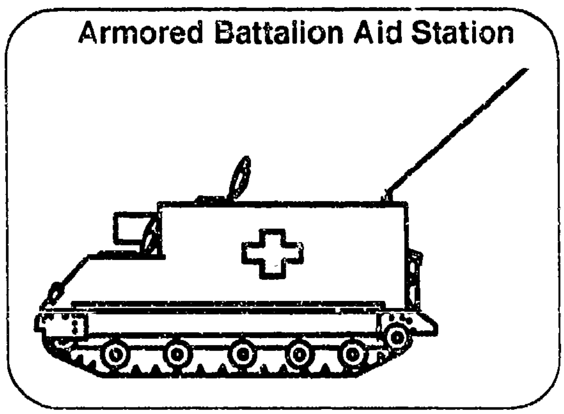


Figure Q-15

Soldier (Medic) Modernization

The Combat Medic Vest System, with an earliest availability date of FY 97 (Figure Q-16), is a highly versatile and durable item which enhances the work

performance of the combat medic and combat life saver. The Combat Medic Vest System:

- Is compatible with the Load Bearing Vest;

- Includes a rear pack that functions independently or in conjunction with the Combat Medic Vest System; and

- Increases the medic's ability to move quickly and unencumbered.

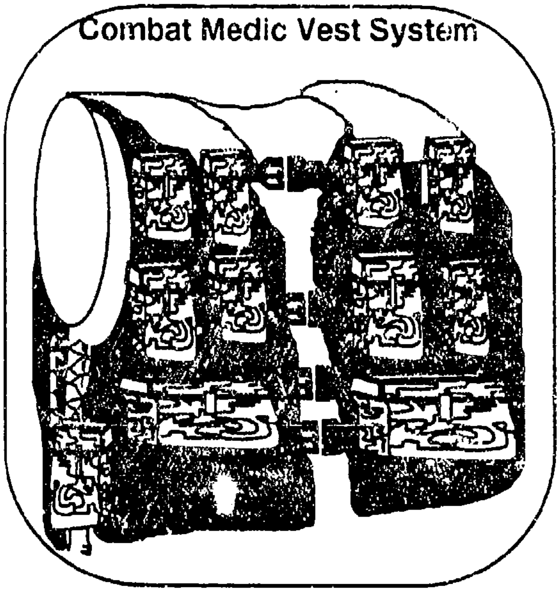


Figure Q-16

Chemically and Biologically Protected Shelter Modernization

The Chemically and Biologically Protected Shelter (Figure Q-17) is in full-scale development. The development of a highly mobile, chemical/biological protective shelter system supports force projection, sustainment, and maneuverability by providing:

- A chemically and biologically protected shelter area for forward medical treatment;

- A contamination-free and environmentally controlled working area for patients and medical staff;

- Decreased morbidity and mortality;

- Increased mobility of treatment elements which will improve operational flexibility; and

• Decreased frequency of relocation necessitated by chemical and biological warfare.

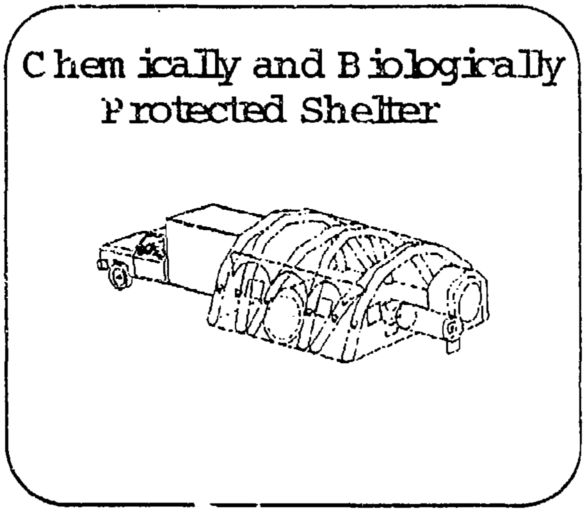


Figure Q-17

The Chemically and Biologically Protected Shelter replaces the obsolete, insupportable M51 shelter and accompanying tentage. Two prototypes underwent customer testing in September 1994. The acquisition plan changed in the fourth quarter of FY 94. The shelter is now type classified Limited Production Urgent, and a limited production contract will be awarded in the second quarter of FY 95. By the first quarter of FY 97, 152 systems are to be fielded to Force Package 1. The remaining Force Package 1 requirements will be obtained through a production contract in FY 97 with projected fielding beginning in FY 98 and ending in FY 00. There is a requirement for additional research, development, test, and evaluation funds in FY 96 to meet full production in FY 97.

Chemically Protected DEPMEDS Modernization

The Chemically Protected DEPMEDS (Figure Q-18) protects modular personnel tentage via chemically hardened tent liners and provides chemical protection to the hospital unit base of corps level medical treatment facilities. The Chemically Protected DEPMEDS:

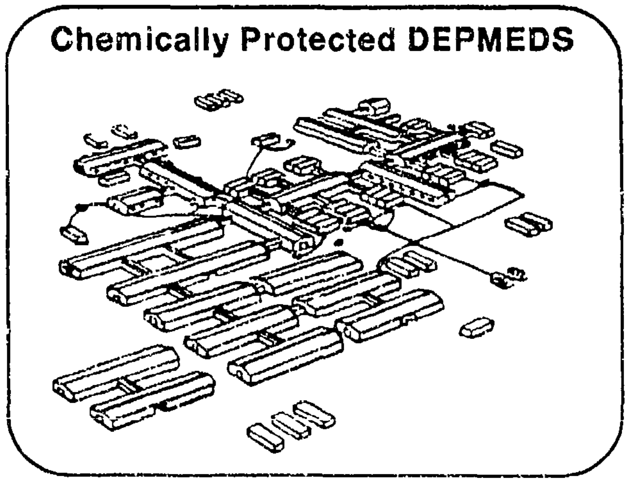


Figure Q-18

- Completes collective protection throughout the theater;

- Allows medical operations in a contaminated environment to continue for up to 72 hours;

- Decreases morbidity and mortality in military operations; and

- Provides a contamination-free area in which medical personnel can work unencumbered by protective clothing.

A concept evaluation has been conducted and a Milestone III decision is scheduled for the first quarter of FY 96. This system is scheduled for fielding in the fourth quarter of FY 96.

Advanced Medical Diagnostic Communications for Combat Casualty Care

A key unfunded medical effort is the AMEDD's Advanced Medical Diagnostic Communications for Combat Casualty Care ($AMDC^4$) program. This program provides real time medical situation awareness and casualty care treatment to the warfighter in a distance and time independent manner. $AMDC^4$ provides superior medical mentoring, monitoring, and clinical consultation, and it enhances command and control throughout the battlefield. Care for the warfighter is substantially improved while medical logistics support and medical assets are optimized. This program exploits myriad advanced technological, medical appliques, integrating modalities (combined audio, visual, and digital advanced technologies) to seamlessly network patient care from Level I division units to Level V facilities in the CONUS. Together, these attributes project medical care forward to soldiers where they are deployed.

The ability to virtually project forward the right skill mix and clinical capabilities greatly enhances the ability to provide quality health care to the soldier. In particular, $AMDC^4$ insertion of specialty consultation from an expert location allows valuable and critically short personnel resources to be dually resourced against deployed and fixed facility patient loads. $AMDC^4$ technology is multifaceted with appliques in support of war and Operations Other Than War, including humanitarian assistance and disaster relief. This initiative is the medical support complement to the Army's force projection strategy and fully integrates with the digitization of the battlefield effort.

As shown in Figures Q-20 through Q-23, the $AMDC^4$ initiative acts as the umbrella for six different but integrated fielding and sustainment thrusts that cross the Army medical force structure.

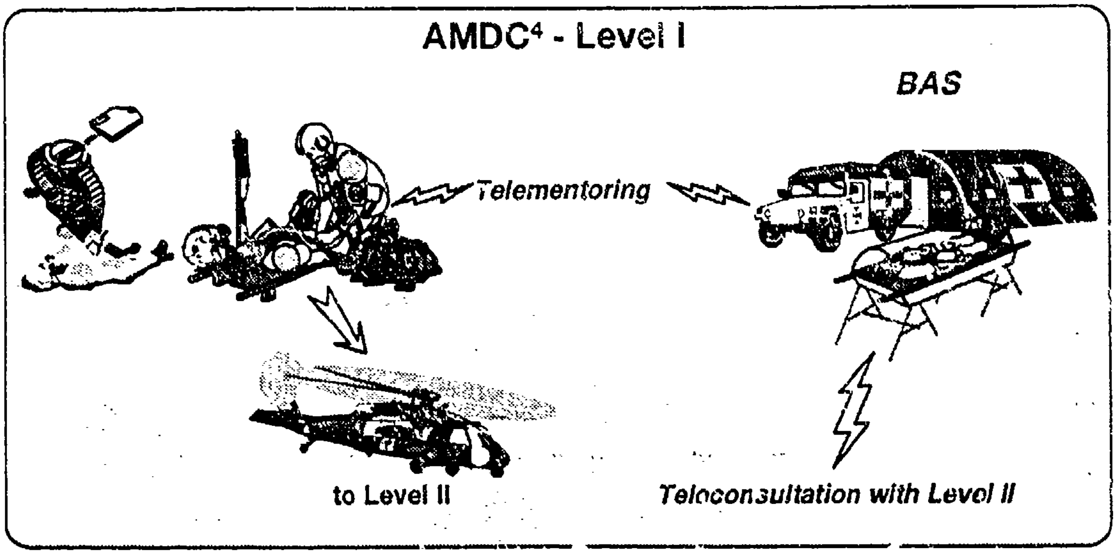


Figure Q-19

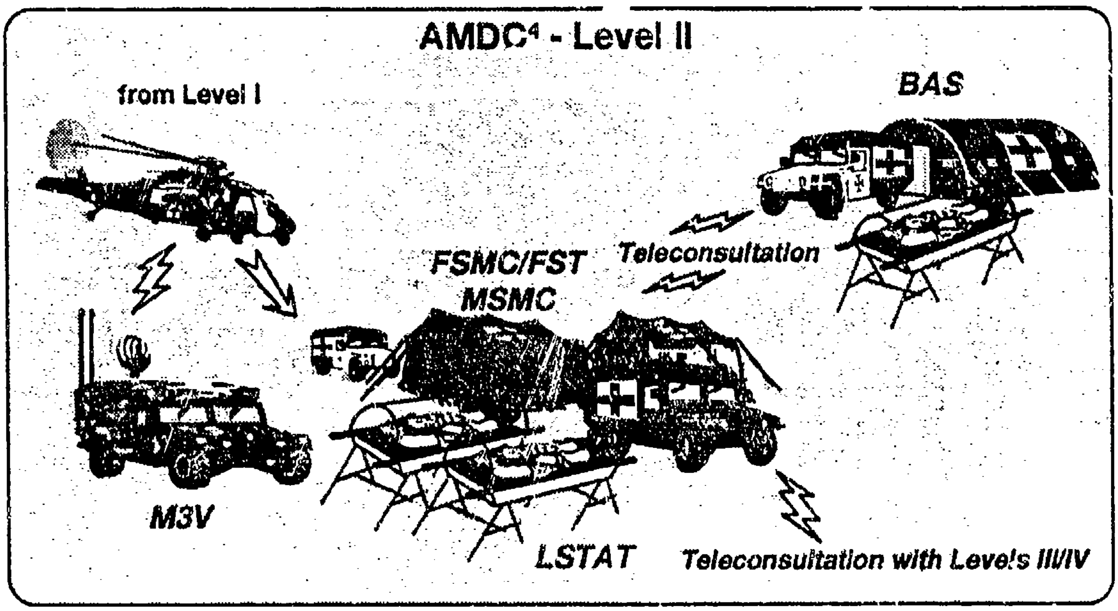


Figure Q-20

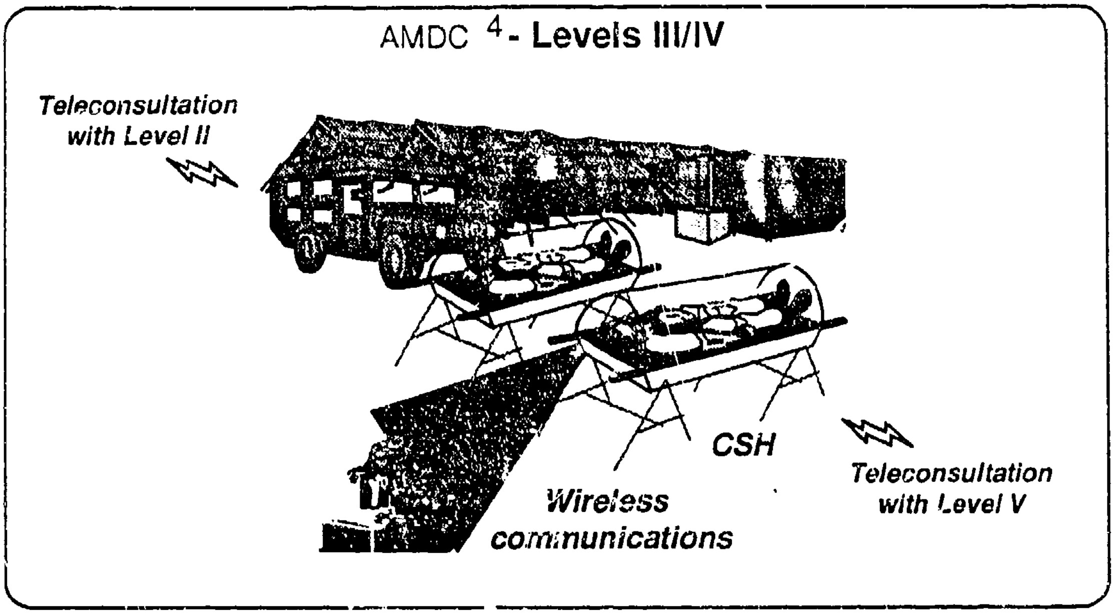


Figure Q-21

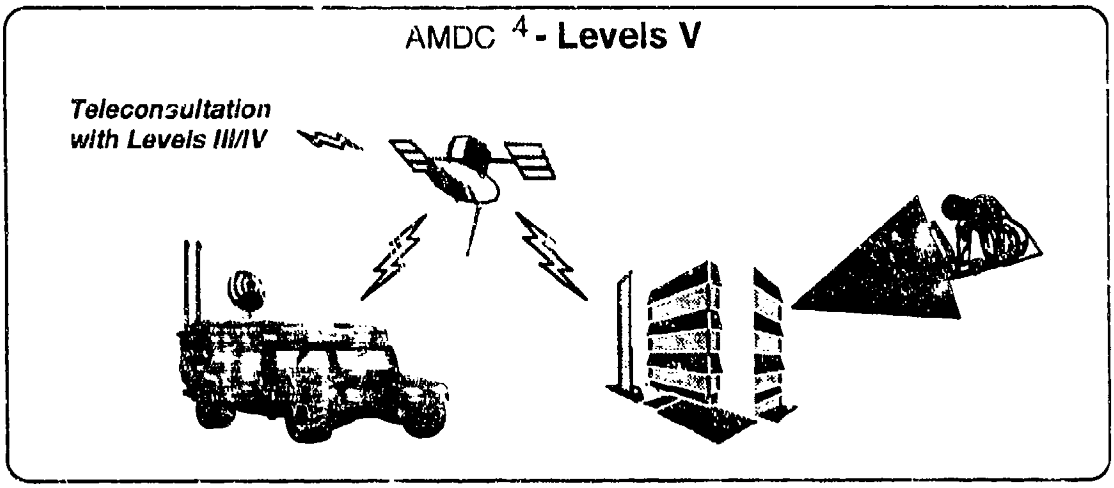


Figure Q-22

AMDC4 1: Far-forward Telemedics Appliques

This thrust establishes time critical, distance independent, prehospital, demand activated casualty care mentoring and consultation within Level I. Medics within the combat battalion area will have the capability to communicate with primary care physicians and physician assistants. The focus is on rapid, enhanced resuscitative care, coupled with prompt evacuation, and enhanced medical situational awareness for medical decision support and command and control.

The materiel package includes:

- Applique 1: Hands-free, two-way radio; Medics' smart pack/global positioning system and stylus-based computing with local intelligence; and

- Applique 2: Text and facsimile data devices at the battalion aid station; still imagery and motion video medical acquisition storage, and transmitter employing SINCGARS.

AMDC4 2: Mobile Medical Mentoring Vehicle

This thrust provides a highly flexible and mobile platform for command and control medical situational awareness. Developed as a customized variant of the Army's Mobile Integrated Tactical Terminal vehicle, this specially adapted platform provides the mobility needed to meet various operational needs as a sending unit, a receiving unit, or a retransmission unit. It is driven by mission, enemy, terrain, troops, and time. As a sending unit, it will maintain contact with division forces and rapidly move into areas of high-intensity conflict. As a receiver, it will dock to other medical assets to assist in the management of patients far-forward. This send/receive capability will also provide a capability to provide "tailgate telemedicine."

Additionally, the mobile medical mentoring vehicle will be able to serve a retransmission capability if needed. This vehicle will provide more robust, higher bandwidth medical telecommunications with direct-link capability to expert specialty care physicians at field or fixed hospital levels. On-site live video and high-resolution still diagnostic medical images can be transmitted and received to support more detailed diagnosis and treatment. The trailer kits will be configured to meet a "go anywhere, do anything" approach to staging the medical specialty support where and when it is needed. The materiel package includes:

- Platform and trailer transportation;

- Medical imaging work stations soft-copy filmless displays;

- Satellite transmission and reception capabilities;

- Independent, ubiquitous communications ports featuring asynchronous transfer mode capability;

- Full motion medical video and multimedia transmitter/receiver; and

- Medical imaging acquisition system (multi-sensor package).

AMDC4 3: Digital Field Medical Treatment Facility Appliques

This thrust consists of three appliques. It includes an intramedical treatment facility (combat support hospital, forward support medical company, and area support medical company), a medical image and data acquisition system/local area network, and a telecommunications package for expert consultation. The transition to filmless and paperless digital information provides the capability to "save and carry" patient records. This simplifies logistics substantially and expedites patient regulating.

Medical treatment facility management and crisis response improve with the use of wireless handheld communicators. The communication package provides high data rate transmission of all modalities (video, audio, and digital) to provide and/or receive expert tertiary care consultation. The TOE hospital is the primary source of specialty consultants in large deployments and is a node of expert support in Operations Other Than War. The appliques for the combat support hospital/forward support medical company/area support medical company include:

- Applique 1: Wireless medical communications, multi-modality transmitter/receiver for treatment, digital acquisition system, medical image and data local area network, full motion video transmitter/receiver;

- Applique 2: All of the above, robust package; and

- Applique 3: Wireless medical communications.

AMDC4 4: Expert Tertiary Care Host Appliques

This thrust provides full motion video telemedicine capability, enabling experts at a medical center in the continental U.S. to project expertise to the battlefield. Ubiquitous communication ports for full modalities (audio, video, and digital), using satellite or terrestrial communication modes, provide anytime, anywhere, direct interfaces in the future. Communication interfaces with civilian medical centers allow the military to diagnose and treat the most widely diverse and individual cases experienced in the field. Additionally, an electronic digital archive for all patient data augments a local area network for instantaneous storage, retrieval, and display of patient medical data. The package includes high data rate telecommunications transmitter/receiver, imagery local area network and archiving system, digital storage and retrieval, and multimedia medical image workstations. This is the enabling package for split-based operations; it further exploits funding support from Congressionally directed peacetime use.

AMDC4 5: Rapidly Driven Advanced Research Projects Agency Technology Insertions

This thrust provides a gateway into Army medicine for rapidly driven Advanced Research Projects Agency (ARPA) medical technology research (from its biomedical development program). It leverages investments from the ARPA program. Currently,

over 20 medically-advanced technological projects with potential Army medical use are undergoing research. This thrust is a mechanism to acquire such technologies as they reach full development, and provides for rapid transitioning to the field. High medical payoff advanced technologies considered for transition include:

- The personal status monitor, which provides warfighter physiologic monitoring data and telemetry;
- The smart litter, with built-in patient monitoring and telemetry systems; and
- High bandwidth, asynchronous transfer mode, telecommunications protocols for medical applications.

AMDC4 6: Telecommunications and Sustainment

This thrust provides telecommunications support and sustainment, including Inmarsat, Milsat, and commercial satellite interfaces. This thrust includes operational costs in the form of terrestrial communications or satellite use and anticipated repair actions. The research funding line allows medical image compression studies and/or alternative communications systems concept explorations through exercise with the battle labs, Louisiana Maneuvers Task Force, and advanced warfighting experiments.

Since telecommunications costs and experiments are an unprogrammed requirement, the research funding line pays for two annual global telemedicine operations, in addition to limited Continental U.S. (CONUS) support until Major Army Commands plan and fund sustainment costs of telecommunications in future Program Objective Memorandums.

SECTION 5

TRAINING

The AMEDD supports the modernized force in peacetime and wartime. As the AMEDD develops its force to support the Army of tomorrow, we cannot lose sight of how the current Army was built. Specifically, the current Army was built on uncompromising adherence to six fundamental planning imperatives: maintain the quality of the force; maintain forward-looking doctrine; maintain the appropriate mix of forces; conduct tough, realistic training; modernize continuously to improve warfighting capabilities; and develop competent, confident leaders. These imperatives are enduring elements because they ensure the Army will remain a trained and ready force able to execute its strategic roles in a changing world.

Army modernization training is part of a total package fielding approach in support of new AMEDD materiel organization or systems. Army modernization training prepares AMEDD soldiers to successfully accomplish their missions by providing training on the operation and maintenance of new equipment being fielded or in new doctrine and organizational changes. Continuing development of new equipment training plans supports the anticipated fielding of all new materiel systems over the near- to mid-terms. This ensures orderly transfer of knowledge about operation and maintenance of equipment to the user.

New equipment training and new organization training materials are integrated into programs at the institutional training base and at units to implement and sustain training for newly fielded equipment. In addition, up-to-date training on new systems being fielded is provided for instructors and key personnel in the training base. The AMEDD has streamlined and improved its system training plan process to provide early-on, effective interface among combat, materiel, and training developers. By fully integrating the system training plan process, the training strategies for each materiel acquisition are fully developed and coordinated, both within and external to the AMEDD.

The AMEDD is the proponent for system and nonsystem medical training devices. System devices are those that support a particular materiel system. Nonsystem devices support general military medical training, training on two or more systems, or training on several different types of equipment.

The development, procurement, and distribution of AMEDD training devices and simulations are well-planned, thoroughly coordinated, and flexible enough to meet the force requirements. Through effective management and integration of training devices, battlefield simulations, and live-fire exercises, we accomplish Army readiness training objectives.

Numerous training devices and simulations are in various stages of development and testing within the AMEDD community. Those which survive a prioritization process based on overall training strategy and needs will be prime candidates to receive procurement funding and fielding.

Projected Fielding of Training Aids and Devices

Battle Simulations Center

The AMEDD Center and School Battle Simulations Center and Training Park is located at Camp Bullis, Texas. The mission and function of the simulations center is to provide the AMEDD Center and School an automated command post exercise system for the conduct of institutional training. The simulations center permits both officer and enlisted personnel to practice command and staff techniques and the management of resources for medical support during combat operations. It also provides a centralized area for battle simulations and joint medical training. The Center enhances training interfaces with other TRADOC institutions, health service support areas, reserve component homestation training, Regional Training Sites (Medical), and training at combat training centers.

Multi-chambered Autoinjector

A companion training device is being developed for the new multi-chambered autoinjector. The new device is a single-barrel, dual-chamber autoinjector to replace the MARK I Nerve Agent Antidote Kit in FY 97. The soldier carries this device for rapid intramuscular administration of nerve agent antidotes.

Current Technologies

Interactive Video Disk

Interactive video disks allow individual soldiers to practice job-related analysis and decision-making skills. They use 10-inch laser disks and require the electronic information delivery system to operate; this restricts use of these products to the AMEDD Center and School. Once mastered, these disks are easily converted to Compact Disk-Read-Only Memory (CD-ROM) or Compact Disk-Interface (CD-I). The Army has not yet fielded enough CD-ROM systems to exploit this technology.

Computer-Mediated Instruction

Computer-mediated instruction provides self-paced, individual instruction with immediate feedback. Computer-mediated instruction products are inexpensive, easily transported, and compatible with commonly available computer hardware. The AMEDD Center and School developed a small number of computer-mediated instruction products for resident training and has recently made them available to the field.

Creation of these products is time-intensive, even with easy-to-use software. Funds are available in FY 97 to institute this program.

Multimedia

Multimedia technology integrates training in problem-solving, decision-making, and other leadership skills into other delivery systems. Technological capability and hardware for field use do exist because a limited number of prototype products are currently in development. Once validated and resourced, the number and scope of multimedia for medical training will increase.

Satellite Training

Satellite training provides simultaneous interactive classroom training to multiple sites. Such capabilities permit widespread training and assure standard training, which are both particularly important to Reserve Component and nonresident medical personnel. Satellite training expands the classroom to the work units. This training can provide requisite training prior to participation in hands-on resident training or field exercises. The technological capability and hardware do exist. The AMEDD Center and School is participating in a TRADOC pilot project sponsored by the Field Artillery School.

Future Technologies

Teletraining

Teletraining expands the concept of satellite training through the use of additional communication technology. High-quality, two-way video/audio transmissions make the classroom without walls a reality. A current commercial infrastructure does not exist to support this technology.

Virtual Reality

Sustainment of critical emergency skills and provision of care in high-risk environments are limited, and surgical procedures are infrequently performed due to risks to patients and providers. Virtual reality has the potential to allow training in these situations, while providing a risk-free environment. The current commercial prototypes are extremely expensive to purchase and operate. Furthermore, they do not provide the total immersion into a virtual environment required for the type of training envisioned. Advances are not expected to bring this immature technology to the capability required. Far-term innovations may rapidly bring virtual reality to the forefront of training.

Electronic Transmission Systems

Electronic transmission systems provide interactive instruction and training materials to students and unit trainers. The AMEDD Center and School has an electronic bulletin board capable of delivering some of these instruction/training materials. Unfortunately, commercial technology does not allow the type of interactive access envisioned. Expansion of this delivery system depends on the availability of commercial technology and hardware. As the information superhighway grows, this will become a reality.

Asynchronous Computer Conferencing

Asynchronous computer conferencing links instructors and students at multiple sites via personal computers. While the technology exists, resources are not currently programmed to exploit this technology.

Electronic Performance Support System

Electronic job aids assist the AMEDD soldiers by providing help, reference, guidance, and on-the-spot training for individuals when required. These aids will provide the soldier hands-free assistance while he or she performs tasks. The technology is emerging to allow voice-activated access to computers. Resources are not programmed to investigate and exploit these systems.

Advanced Medical Diagnostic Communications for Combat Casualty Care

Advanced medical diagnostic communications for combat casualty care, currently being developed for far-forward care, incorporates embedded training capabilities that now offer real time training opportunities to the combat medic. As development of the system progresses, additional training requirements and changes in existing tasks are likely to emerge. Currently, there is limited capability for the required training.

SECTION 6

CONCLUSION

This medical annex describes the Army Medical Department's force modernization strategy and articulates specific goals, modernization efforts, and known shortfalls. It focuses on supporting the Army's task to fight and win our nation's wars by providing a synchronized CHSS.

Shortcomings still exist despite our aggressive modernization effort. For example, funding is not available:

- To adequately resource the investigation of newly emerging infectious disease threats;

- To maintain a capability for aerosol testing of medical countermeasures against biological agents;

- To support advanced clinical testing of antimalarial and antileishmanial drugs or vaccines against ETEC, Chikungunya, Tick-borne Encephalitis, and Argentine Hemorrhagic Fever;

- To sustain or modernize 22% of field medical units in the Contingency Force Pool;

- To modernize or field materiel associated with advanced medical diagnostic communications for combat casualty care;

- To procure biological and chemical collective protection for Force Packages 2 and 3;

- To support modernization of the current aeromedical evacuation fleet through the UH-60Q; or

- To procure the High Capacity Air Ambulance.

Figures Q-23 through Q-26 list the funded and unfunded research, development, and acquisition efforts for FY 96-01.

Medical Science and Technology Program
(6.1-6.3, Fiscal Years 1996-2001)

Does	Does not
• Support the development of methods to prevent, diagnose, and treat infectious diseases that impede worldwide deployment or that compromise military operations • Sustain research investigating field methods of fluid resuscitation and control of life-threatening hemorrhage • Support the development of countermeasures for principal biological threat agents • Enable the transition of countermeasures for existing chemical warfare agents • Provide system-safety criteria and exposure standards for current systems, enhanced methods for reducing environmental injury, and guidance for reducing combat stress casualties • Provide for basic and exploratory studies of vaccines to prevent HIV infection	• Adequately resource the investigation of newly emerging infectious disease threats • Support the development of new anesthetics, drugs for the regeneration of the nervous system, or techniques for vascular repair in the field • Maintain a capability for aerosol testing of medical countermeasures against biological agents • Enable research on newly recognized chemical warfare threat agents • Adequately resource the development of health hazard assessments for military women • Sustain applied research on the prevention of HIV infection

Figure Q-23

Medical Advanced Development Program
(6.4-6.5, Fiscal Years 1996-2001)

Does	Does not
• Enable evaluations of the effectiveness of antimalarial drugs and vaccines against Rift Valley Fever, Hantaan virus, Campylobacter, Cholera, and Hepatitis A • Support technical, clinical, and operational evaluations of field medical devices and pharmaceuticals for far-forward combat casualty care • Provide for preliminary developmental testing of neuromodulators that reduce fatigue and stress • Sustain developmental testing of essential biological agent toxoids, vaccines, and diagnostic systems • Support developmental testing of the Nerve Agent Antidote System, a Multichambered Autoinjector, and a Topical Skin Protectant	• Support advanced clinical testing of antimalarial and antileishmanial drugs or vaccines against ETEC, Chikungunya, Tick-borne Encephalitis, and Argentine Hemorrhagic Fever • Adequately resource safety and immunogenicity testing of SEB toxoid or clinical testing of improved anthrax vaccine • Support the transition to advanced development of improved vaccines against Venezuelan Equine Encephalitis, Plague, Botulinum, and Brucella • Provide for validation testing of the Nerve Agent Antidote System and a Topical Skin Protectant

Figure Q-24

Medical Acquisition Program
(Fiscal Years 1996-2001)

Does	Does not
• Sustain 78 percent of field medical units in the Contingency Force Pool • Procure new modernization technology insertions for 78 percent of field medical units in the Contingency Force Pool • Support fielding and new equipment training associated with the conversion and sustainment of Medical Force 2000 units • Support 100 percent of Force Packages 1 and 2 deployment potency and dated push packages	• Sustain 22 percent of field medical units in the Contingency Force Pool • Modernize 22 percent of field medical units in the Contingency Force Pool • Sustain or modernize any field medical units in Force Packages 2 and 3 • Support Force Packages 3-7 and any remaining field medical unit potency and dated push packages • Modernize or field AMDC[4] materiel or medical information technology and communication infrastructure

Figure Q-25

Biological and Chemical Acquisition Program
(Fiscal Years 1996-2001)

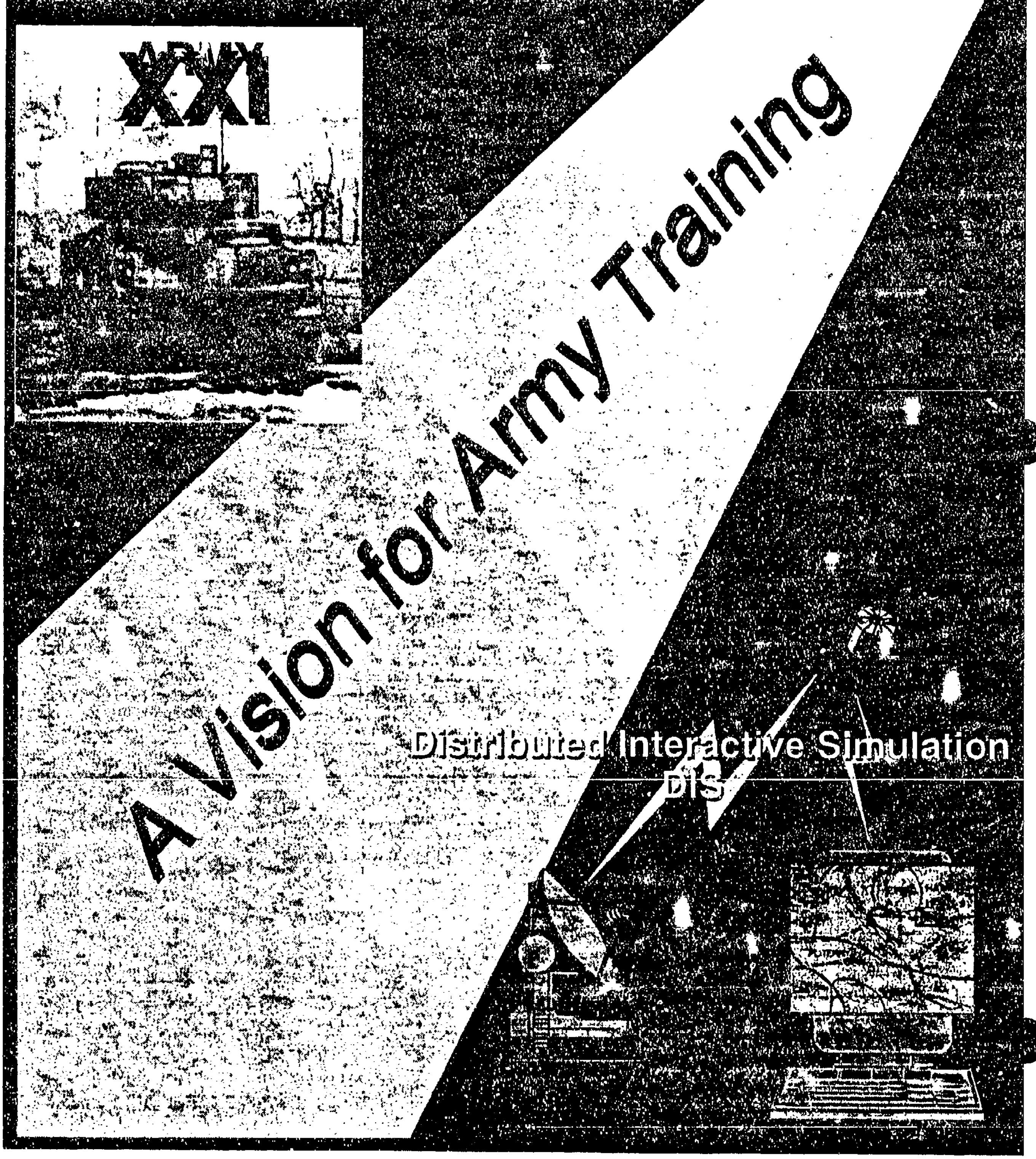
Does	Does not
• Continue to produce biological vaccines (anthrax, botulinum toxoid, Q-fever, and encephalitis) • Continue to produce botulinum antitoxin • Procure patient chemical wraps • Perform operational studies • Procure biological/chemical resuscitative devices • Procure XM-28 (biological/chemical collective protection) for Contingency Corps Force Package 1 • Store biological defense vaccines • Expand production of biological defense vaccines (for additional vaccines and increased production rates) • Procure vital signs monitor • Procure powered ventilator • Procure multichambered autoinjector • Procure chemical/biological protected shelter for Contingency Corps Force Package 1	• Procure biological/chemical collective protection for the remainder of the force

Figure Q-26

Our challenge is to ensure that a trained and ready medical force is fully capable of meeting the challenges of the 21st Century (Force XXI). The AMEDD is committed to future readiness and the American soldier.

ANNEX R

TRAINING



ANNEX R

TRAINING

SECTION 1

INTRODUCTION

The Army's modernization vision for Land Force Dominance directly supports U.S. National Military Strategy (NMS). Five modernization objectives are necessary to realize our vision:

- Project and Sustain the Force;
- Protect the Force;
- Win the Information War;
- Conduct Precision Strike; and
- Dominate the Maneuver Battle.

This Annex details, assesses, and provides the rationale for the major training programs that support all five of these key building blocks of Land Force Dominance!

CHIEF OF STAFF, ARMY VISION

"...Army of the 21st Century--A Total Force trained and ready to fight, serving our nation at home and abroad, a strategic force capable of decisive victory."

"As the cornerstone of readiness, training remains the Army's most important peacetime mission."

Army Training (AT) XXI is the concept for Army training in the 21st Century. AT XXI integrates the entire spectrum of Army programs, from units and schools and through simulations, provides a strategy to integrate ongoing initiatives into a coherent, integrated training system. To accomplish the goals of AT XXI, the Training and Doctrine Command (TRADOC) commander directed the development of the AT XXI campaign plan.

The AT XXI campaign plan is rooted in Army missions, and takes into account future Doctrine, Organizations, Training, Leader Development, Materiel and Soldier issues (DOTLMS) at all echelons of command, across all Battlefield Operating Systems (BOS) for the entire range of military operations. Distributed Interactive Simulation (DIS) technology will revolutionize collective training strategies. Force XXI will be trained and ready as an end state of AT XXI. The success of AT XXI is crucial to future Army training; it builds tools and systems with Army-wide application into the 21st Century.

ARMY TRAINING XXI VISION

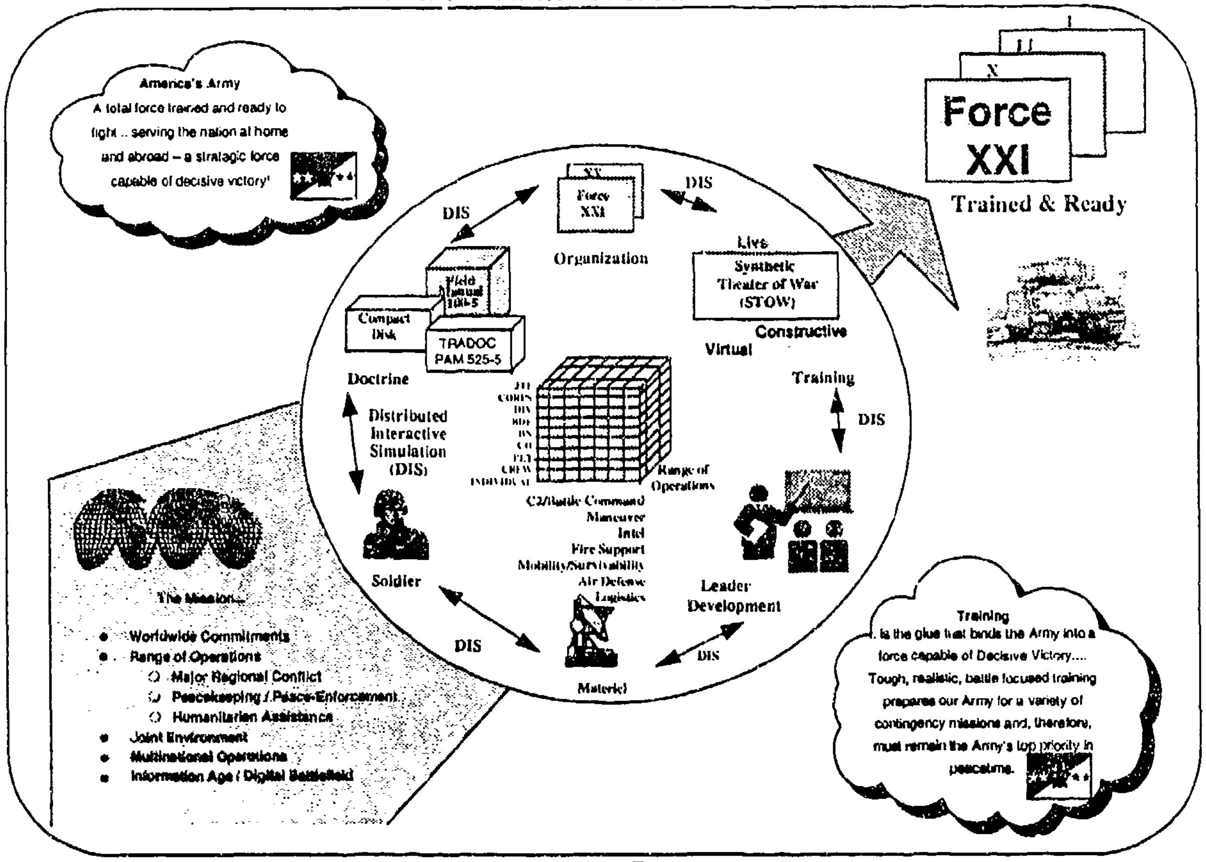


Figure R-1

To make the AT XXI vision a reality, Army training developers are developing and executing a strategy based on sound assumptions, and are forming clear concise goals. The AT XXI strategy is based on assumptions supportive of the Force XXI objectives:

- AT XXI will apply to the Total Army. It will ensure the Active and Reserve Components (AC/RC), and Army civilian employees, are ready to implement the NMS. Army training standards are the same for the AC and the RC. AT XXI will allow commanders, through tough, realistic, battle focused training, to build and sustain the ability of soldiers and leaders to fight and win as a combined arms team in both joint and multinational operations;

- Institutional and self-development strategies will be tailored to collective training;

- Resources are constrained and no tolerable excess of resources exists for redundant development and experimentation. Training faces a formidable challenge. The NMS emphasizes force projection, multinational warfare, and

nation assistance. Our challenge is to support the NMS and sustain readiness as we carefully manage declining future training resources; and

- Potential technology must be emphasized and exploited even though application of all technologies may not be known. The information age must be managed in order to achieve a digitized force.

In order to implement the AT XXI vision, four key functional aspects must first be understood: the structured training concept to assist in the planning, execution, and assessment of training development; identification of the three pillars of training and the five components of the training system; integration of the components into a system and assignment of responsibility within a campaign plan.

AT XXI:
A VISION FOR FUTURE ARMY TRAINING

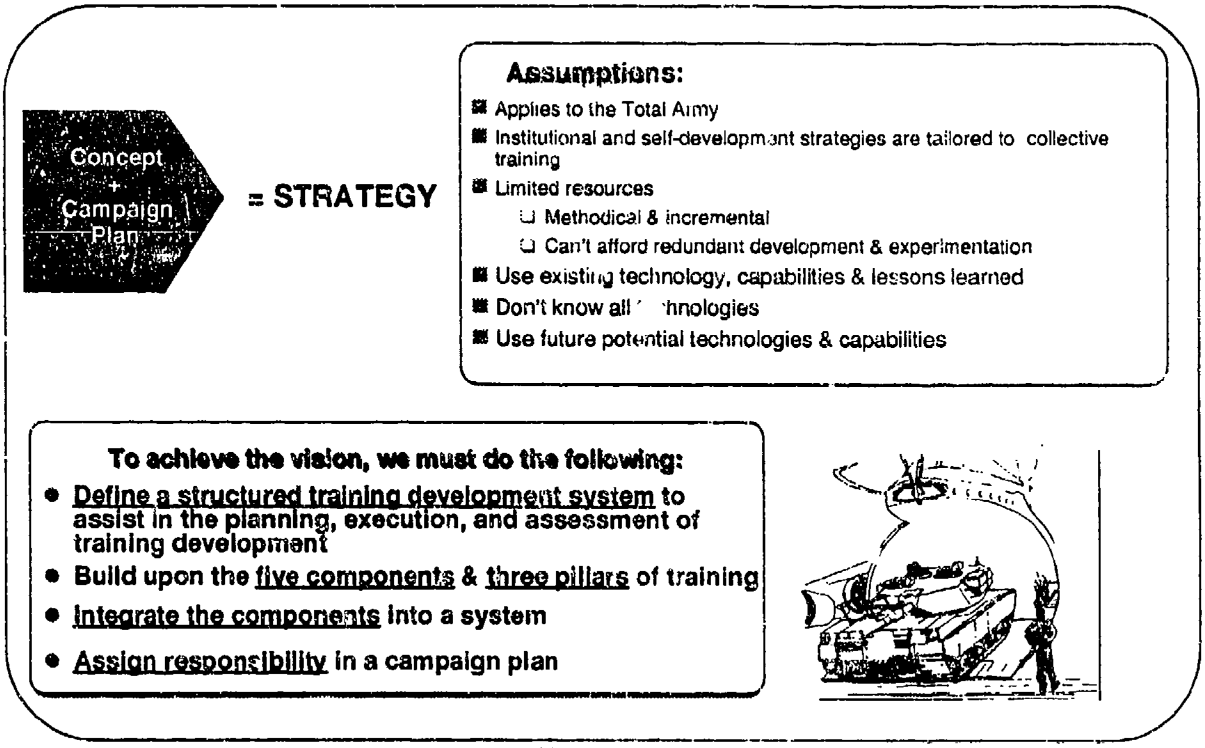


Figure R-2

The structured training concept being used as the foundation for the development of AT XXI is the Combined Arms Training Strategy (CATS). CATS is the Total Army's architecture to train and educate its people and units. The Army relies on CATS, developed by TRADOC, as the conceptual framework to establish Total Army training resource requirements.

CATS provides doctrinally based strategies for training individual and collective tasks and skills to specified standards in Army schools and units, as well as for self-development training. The strategies include events and gates, and identify training resources required to train units to standard during institutional training, field training, simulation supported training, live fire training, training at a Combat Training Center (CTC), joint training and force projection, and RC premobilization and postmobilization training.

Future CATS strategies will focus on shaping resource master plans and modernization plans, and establishing training resource requirements that are carried into the planning, programming, budgeting, and execution process.

Training Development System
Combined Arms Training Strategy (CATS)

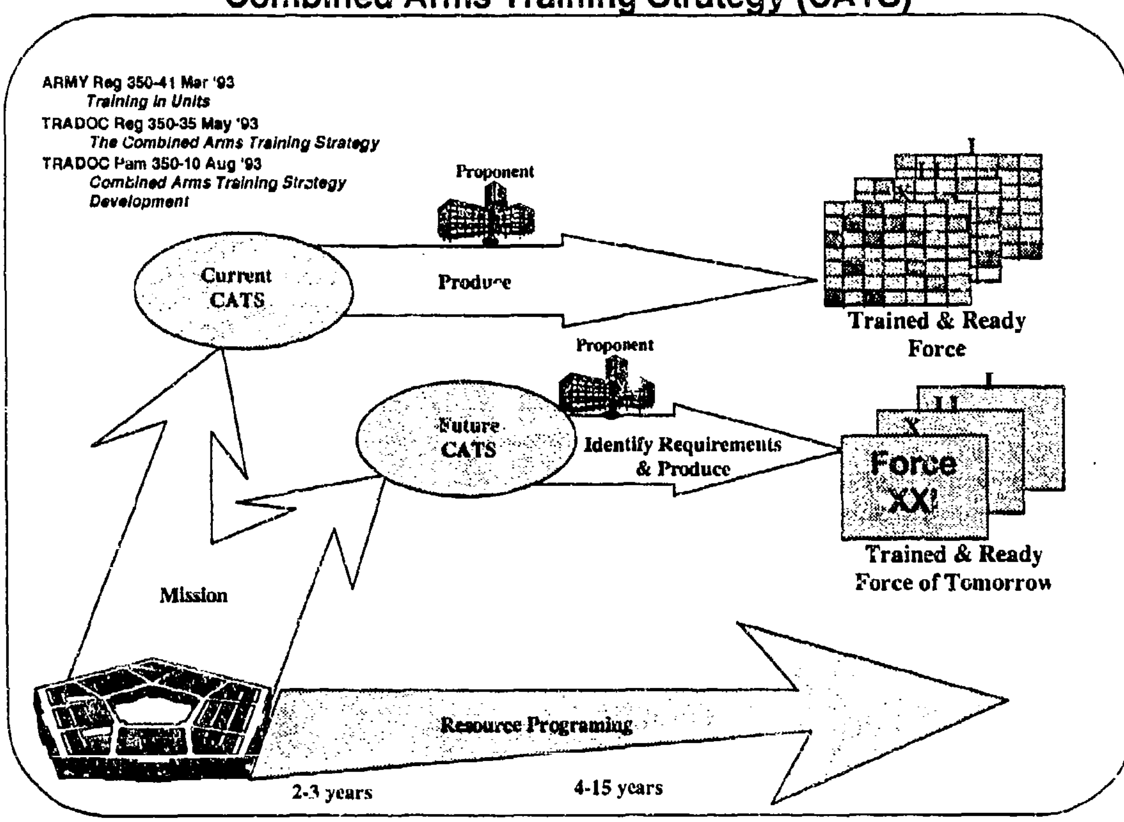


Figure R-3

The three pillars of Army training are training in units, schools, and self-developed training. Unit training reflects the collective training effort, and builds on institutional and self-development training and training support of collective tasks. The institution and self-development training efforts are a part of classroom XXI, often referred to as the "classroom without walls." Classroom XXI is a part of AT XXI and emphasizes interactive distributive training as a modern training initiative.

The five components identified as centers of gravity for AT XXI are the Standard Army Training System (SATS); the Training Support Package (TSP); Training Aids, Devices, Simulators and Simulations (TADSS); Standard After Action Review System (STAARS), and the library.

SATS is a software program-based training management tool. It aids commanders in training resources management and provides a situational training template for units. SATS implements the Army training policy described in *Field Manual, 25-100, Battle Focused Training.* It saves the commander time and manpower, and offers both prescriptive and descriptive training guidance.

TSPs are doctrinal training templates which offer commanders total training packages for implementation of training to achieve specific training objectives. The TSP includes exercises and tables combined with a scenario, conditions, standards and semiautomated forces produced by an event generator. The TSP is a progressive performance oriented series of exercises designed to increase task proficiency gradually. The term "crawl, walk, and run" is often associated with the use of a TSP training.

TADSS offer realistic training tools to supplement field training. TSPs are designed to maximize training from the use of TADSS. TADSS are broken into three general categories: live, virtual, and constructive. In the future, the Synthetic Theater Of War (STOW) will link these three forms of simulation. TADSS in the future will be DIS compliant with standard terrain, enemy, and icon databases; it will be fully embedded and fully integrated into the Total Army system.

STAARS captures the Army's attempt to standardize all after action review systems in order to standardize the information available from these systems. STAARS, used by live, virtual, and constructive simulations, must be synchronized in order to provide universal assessment on proficiency training, readiness, lessons learned, and resource management. STAARS will use the Force XXI infonet to feed information into the library.

The **library** is the sum total of all forms of training information. The library will use the Army Training Information Management Program (ATIMP) as the electronic "library without walls." Within the ATIMP, the Training Module (TRAMOD) will have both internal and external digitized access to training information. These sources of information will be the foundation of the SATS database.

Pillars & Components

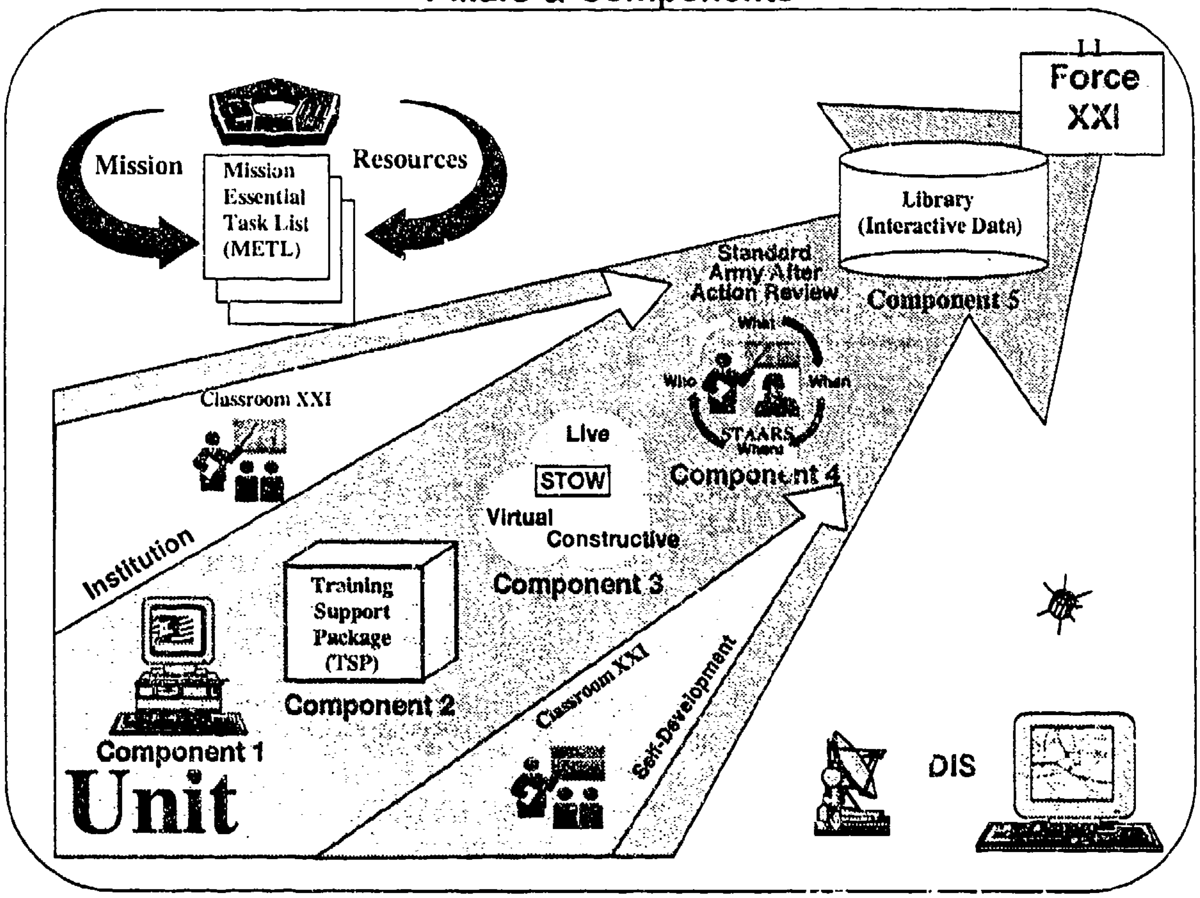


Figure R-4

The five components of AT XXI, when integrated, form a total, self-sustaining system. Commanders of the future will use an automated training management support system to help optimize available training resources, plan, prepare, and assess the execution of training programs.

The commander's training plan is derived from assessments of the unit's training proficiency based on its Mission Essential Task List (METL), guidance from the automated quarterly training brief, and the availability of training resources. Automated training management provides the commander the tools to develop and integrate these products into training plans, calendars, and schedules. Using SATS, the commander determines the training management database and considers the available resources while evaluating training. Next, using the resource recapitulation plan, the commander prioritizes training requirements.

The task database is an automated MTP integrated horizontally and vertically across the BOS to provide a complete directory of critical combat functions. The database evolves continually, based on the lessons learned from Observer/Controller (O/C) and proponent input.

The Interactive Training Event Menu (ITEM) merges maneuver and gunnery training in order to closely replicate combat conditions. Given the commander's training requirements from the automated training management system, ITEM considers the best mix of various live, virtual, and constructive training and recommends event templates and models for a sequence of training events.

Based on the commander's selection, the training event model generates unit and threat systems, scenarios, environments, and Semi-Automated Forces (SAF) for unit training. Throughout the process, the commander can adjust any of the variables to better meet the unit's training requirements.

Another key training management tool of the commander is the STAARS. Throughout each training event, the unit's performance is automatically assessed against the commander's training objectives using the automated MTP training evaluation outlines in the task database. Unit gunnery performance and O/C input provide additional feedback to the unit commander. The assessment tools allow the commander to replay key portions of the training event or change scenario characteristics using the event generator to increase or decrease the intensity of the training environment. Additionally, using the automated assessment tool, the commander can automatically update the unit's training status. Transparently, the system tracks unit success and weakness as part of the data studied for upgrades of the task database.

AT XXI

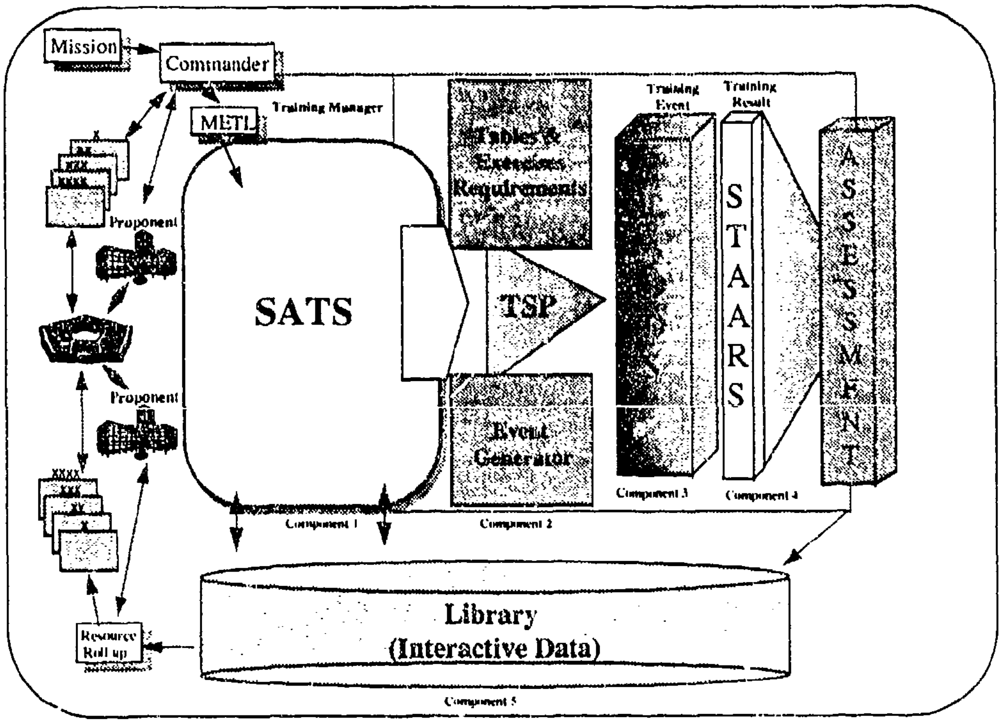


Figure R-5

The AT XXI vision will be achieved by synchronizing the effort of all five components. This effort is being driven by the AT XXI campaign plan being produced by TRADOC. Of these five components, two (TADSS and STAARS) are managed by the Training Mission Area (TMA) program.

AT XXI CAMPAIGN PLAN

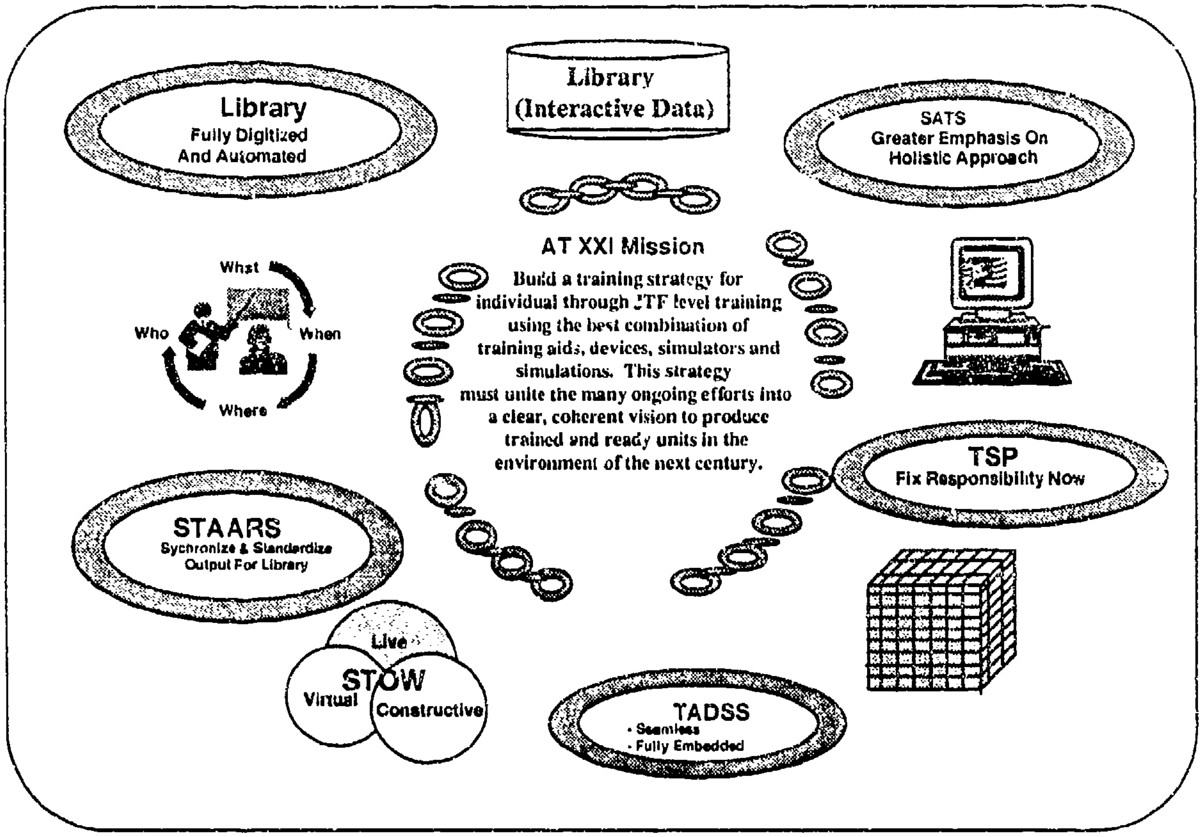


Figure R-6

The Army will focus its modernization effort through the TMA. The programs in each TMA are carefully crafted to fill the gaps in system training. Taken together, TMA programs provide TADSS and STAARS which are critical to the attainment of modernization objectives and the success of soldiers and America's Army.

SECTION 2

WARFIGHTING CONCEPT

The mission of the U.S. Army is to organize, train, equip, and provide decisive forces capable of rapid deployment to, and immediate engagement in, any location and situation. As outlined in the NMS, America's Army must be able to execute prompt and sustained joint and multinational combat operations culminating in decisive victory with minimum casualties. The Army must maintain Land Force Dominance and meet the challenges of the 21st Century (Force XXI). Additionally, America's Army must have the versatility to apply its organizational skills and operational capabilities in support of operations other than war (OOTW).

In the past, the Army has relied on traditional, live field training exercises to provide the combat training needed for success in wartime. There continues to be a need for live fire training exercises, routine deployment exercises and crew drills. The expanded use of simulators and simulations **enhances** these live training exercises. The Army's vision for the future must support the capability to train in an affordable manner with technology moving toward a seamless synthetic environment consisting of live, virtual and constructive simulations to:

- Replicate as closely as possible actual operational conditions so soldiers can operate in the synthetic environment as they could expect to operate under actual wartime conditions;

- Support both Active and Reserve Components around the world as they execute operations at tactical, operational, and strategic levels;

- Foster the participation of joint, multinational and interagency forces, worldwide as a power projection force; and

- Provide relevant practice fields for users.

The Army supports this vision by providing the training materiel items that will challenge and motivate leaders and soldiers to develop and maintain warrior competence and confidence, safely, and within resource constraints. Traditionally, these training items have consisted of:

- **Combined Arms Tactical Trainers (CATT):** A network of simulations and simulators replicating vehicles and weapons systems of the combined arms team;

- **Family of Simulations (FAMSIM):** Provide realistic joint and multinational battlefield environments for commanders and staffs to practice the execution of

command, control, synchronization, and employment of combat arms assets without incurring the high cost of field training exercises;

- **Nonsystem Training Devices (NSTD):** These critical home station and individual/crew training devices and simulators enable soldiers, leaders, and units to conduct realistic and demanding training on tasks which would otherwise be too costly or hazardous to train;

- **Combat Training Centers:** The TMA provides the TADSS and instrumentation systems used at the CTCs, the Army's premier practice fields;

- **Training Ammunition:** Training Ammunition enables AC/RC units to achieve training standards with individual/crew served weapons and also provides ammunition support for the training base;

- **Land, Ranges, Targets, and Environment:** Range instrumentation, targetry and devices to support Military Construction, Army (MCA) approved range projects and Army range modernization requirements, identified in the Army Range and Training Land Master Plan, are developed and procured by the TMA;

- **Other Special Programs:** These include Louisiana Maneuvers Task Force (LAM TF), Distributed Interactive Simulation (DIS), and Regional Training Sites (RTS).

The Army Chief of Staff placed the Deputy Chief of Staff for Operations and Plans (DCSOPS) in charge of Army models, training aids, devices, simulators, and simulations (MTADSS). The Training Simulations Division in the Training Directorate (DAMO-TRS) is the executive agent for MTADSS and serves as the single point of contact.

In support of this change, systems and nonsystems training devices are managed along BOS lines. Those devices and systems which cross multiple BOS are managed by specific functional managers within the Training, Exercises, and Military Operations cell of the Simulations Division of Army Training. The information in this annex of the Army Modernization Plan reflects this realignment and is presented by BOS.

SECTION 3

CURRENT PROGRAM ASSESSMENT

General

As world events bring about change, particularly changes in the threat, soldiers must receive training to enable them to protect our country, our national interests and our allies in time of war or emergency. The goal of Army training is threefold: to field training materiel needed to support development of soldier and leader skills (which, in turn, supports a modernized force); to portray varied threats; and to apply advanced technologies to ensure realistic and safe training within resource constraints.

Future military engagements are anticipated to be characterized by fast moving forces with unprecedented lethality. On the future battlefield, commanders and their troops will need to react to a variety of weapons systems and provide support in many directions, under conditions of obscurity and darkness, and in extremely "dirty" environments (i.e., nuclear, biological, chemical (NBC) contaminated). Weapons systems with reduced crew sizes, operating in isolated geographical areas, will be challenged to meet the more complex and more sophisticated threats of the future.

The assessment addresses the following BOS and TMA components. Each provides training support to the soldier:

- Battle Command
- Intelligence
- Maneuver
- Aviation
- Fire Support
- Mobility/Survivability
- Air Defense
- Logistics
- Combat Training Centers
- Training Ammunition
- Land, Ranges, Targets, and Environment
- Other Special Programs

Figure R-7 depicts HQDA assessments of BOS and TMA capabilities to meet training deficiencies. Each BOS and TMA component is rated **RED, AMBER,** or **GREEN.** The remainder of this section provides information about each of the TADSS that comprise the BOS areas and TMA programs.

Ratings and their meanings are as follow:

RED - No capability exists, or that which exists is incapable of defeating the threat or providing the support required;

AMBER - A limited capability or quantity exists to perform the mission; and

GREEN - An adequate capability and quantity exists to perform the mission.

TRAINING ASSESSMENT OF BOS AND OTHER AREAS				
BOS/ OTHER AREA	DEFICIENCIES	NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
BATTLE COMMAND	No Man-in-the-loop modeling capability to support DoD DIS initiatives No Bn/TF level Battle Distributive Simulation-Developmental capability to exploit new technology No network simulation capability for the Bn/TF to do combined arms training w/EN, ARTY, and ADA forces No acquisition development strategy savings through prototype simulations No combined arms weapon system prototyping and evaluations No combined arms doctrinal evaluation base	AMBER	AMBER	AMBER
INTELLIGENCE	Limited IEW training devices in near-term Embedded trainer in development for Teammate No embedded training systems for five systems (Trailblazer, Quickfix, JSTARS, Guardrail, and UA..) Limited capability with Sensor Signal Simulator	RED	AMBER	AMBER
MANEUVER	Less than acceptable rate of MILES replacement RC Impact: No GUARDFIST Bradley for Total Force	AMBER	AMBER	AMBER

Figure R-7

TRAINING ASSESSMENT OF BOS AND OTHER AREAS

BOS/ OTHER AREA	DEFICIENCIES	NEAR-TERM FY 95-96	MID-TERM FY 97-00	FAR-TERM FY 01-09
AVIATION	Partial funding for AVCATT	AMBER	AMBER	AMBER
FIRE SUPPPORT	No CTC or Homestation SAWE-RF	AMBER	AMBER	AMBER
MOBILITY/ SURVIVABILITY	M1 Breacher/MAB partially funded Stand-off Mine Detection partially funded No NBC Training Devices in near- and mid-terms	RED	RED	AMBER
AIR DEFENSE	ADCATT partially funded mid- and far-terms	RED	RED	AMBER
LOGISTICS	CSS/TSS partially funded	AMBER	AMBER	AMBER
COMBAT TRAINING CENTERS	No objective assessment of Lt Inf Live Fire (JRTC) Limited capability of Force-on-Force and Live Fire in urban environment (JRTC) Limited capability of Air/Ground operations (CTC) Limited capability to exercise modernized systems on instrumented battlefield at NTC, JRTC, and CMTC Inability to fully exercise modernized systems in Live Fire (NTC)	AMBER	AMBER	AMBER
TRAINING AMMUNITION	Cannot resource entire requirement in mid- and far-terms	GREEN	AMBER	AMBER
LAND, RANGES, TARGETS, AND ENVIRONMENT	Shortage of Engagement Skill Training Device (EST) Inadequate instrumented range capability (PRIME) Shortage of realistic thermal targets (AITST)	AMBER	RED	RED
OTHER SPECIAL PROGRAMS	Provide minimum essential capability to execute OSD lead responsibilities for implementation of DIS architecture development Provide limited capability beyond DIS demos Limited implementation of DIS for training, combat development and other functions	AMBER	AMBER	AMBER

Figure R-7 (Cont'd)

Battle Command Battlefield Operating System: AMBER.

Battle command is the art of battle decision-making, leading, and motivating soldiers and their organizations into action to accomplish given and implied missions. It includes visualizing current state and future state, then formulating concepts of operations to get from one to the other at the least cost. It also includes assigning missions; prioritizing and allocating resources; selecting the critical time and place to act; and knowing how and when to make adjustments during the fight. Systems and nonsystem training devices include: Brigade/Battalion Battle Simulation (BBS), Corps Battle Simulation (CBS), Battle Focus Trainer (BFT)/JANUS program, Warfighters Simulation 2000 (WARSIM 2000) Program, and Tactical Communications Simulator (TACCOMSIM) Program. Figure R-8 summarizes budget, Program Objective Memorandum (POM), and Extended Program Annex (EPA) capabilities for the Battle Command BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
BATTLE COMMAND BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES	**DOES**	**DOES**
BBS (F)	BBS (F)	WARSIM 2000 (PF)
CBS (F)	CBS (F)	
BFT/JANUS (F)	BFT/JANUS (F)	BFT/JANUS (F)
	WARSIM 2000 (PF)	
DOES NOT	**DOES NOT**	**DOES NOT**
	TACCOMSIM (U)	TACCOMSIM (U)

F - Funded U - Unfunded PF - Partially Funded

Figure R-8

Brigade/Battalion Battle Simulation (BBS) Program: GREEN. BBS is a mature system funded at sustainment levels only and will not be funded for additional enhancements. BBS is an automated simulation to train brigade/battalion commanders and staffs the execution and control procedures and decision making skills essential to win on the battlefield. Battalion/brigade CPX and command and staff nodes will be fielded.

Corps Battle Simulation (CBS) Program: GREEN. CBS is also a mature system, funded at sustainment levels only and will not be funded for additional enhancements. CBS trains corps and division commanders and their staffs the command and control skills needed to conduct deep operations/AirLand Battle operations. It exercises the command and staff skills used to control joint operations/tactical forces, combined arms forces, maneuver forces, and the combat support and combat service support systems in an operational/tactical environment.

Battle Focus Trainer (BFT)/JANUS Program: GREEN. BFT/JANUS is fully funded for procurement through mid-term. It is an automated simulation which trains company commanders and platoon leaders in battle focus necessary skills (synchronization and planning) to win on the modern battlefield. BFT/JANUS is also used as a seminar trainer by the Tactical Commander Development Course (TCDC) for brigade and battalion battle synchronization training.

Warfighters' Simulation 2000 (WARSIM 2000) Program: AMBER. Program is partially funded and is the Army's future computer-based battle simulation. As the Army component of Joint Simulation System (JSIMS), WARSIM 2000 will be an update in functionality, fidelity, and technology of current FAMSIM (CBS and BBS). When fully implemented, WARSIM 2000 will be the standard Army training simulation system to train unit headquarters and battle command post staffers, from battalion through theater level, in joint and multinational battle scenarios. It will be designed to allow units worldwide to train in their command posts, at homestation, using organizational equipment, with minimum overhead. The system will meet emerging DIS standards and protocols, thus providing a comprehensive joint exercise environment capable of linking with simulators, such as the CCTT, force-on-force instrumented exercises, and with simulations developed under DIS standards by other Services and allies.

Tactical Communications Simulator (TACCOMSIM) Program: RED. TACCOMSIM is unfunded, but when available it will use computer-assisted instruction to train signal officers, warrant officers and noncommissioned officers to plan, install, operate, and manage hybrid and digital tactical communications systems. Without this device, tactical communications network managers can train only through limited major and expensive CPX-type exercises.

Intelligence Battlefield Operating System: AMBER.

The Intelligence BOS includes the organized efforts of a commander to gather and analyze information on the environment of operations and the enemy, obtaining and synthesizing battlefield information prior to beginning operations and assembling an accurate picture of the battlefield utilizing signal, human, imagery, measurement, and signature collection and production, plus counterintelligence services. The training devices support the commander's ability to synchronize and execute operations; enhances the capability to obtain knowledge of enemy/weather/geopolitical features; and trains skills to operate, troubleshoot, diagnose, fix, and maintain equipment.

Devices train individual/leader intelligence/communication skills through use of simulators/simulations/emulations encountered in combat or threat environment; provide capabilities to teach active measures required to destroy, neutralize, degrade and suppress enemy electromagnetic emitters; and provide realistic, safe, cost effective training without risk to soldiers or actual equipment. Systems and nonsystems training devices include: Tactical Simulation (TACSIM)/Rapid Scenario Preparation Unit For Intelligence (RASPUTIN) Program, Signal Intelligence/Electronic Warfare Equipment Maintenance Trainer (SEMT), and Intelligence/Electronic Warfare Tactical Proficiency Trainer (IEWTPT).

Figure R-9 summarizes budget, POM, and EPA capabilities for the Intelligence BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES INTELLIGENCE BOS		
Near-term (FY 95-96)	**Mid-term (FY 97-00)**	**Far-term (FY 01-09)**
DOES **IEWTPT (PF)** **TACSIM/RASPUTIN (PF)** **DOES NOT**	**DOES** **IEWTPT (PF)** **TACSIM/RASPUTIN (PF)** **DOES NOT** **SEMT (U)**	**DOES** **TACSIM/RASPUTIN (PF)** **DOES NOT** **SEMT (U)** **IEWTPT (U)**

F - Funded **U - Unfunded** **PF - Partially Funded**

Figure R-9

Tactical Simulation (TACSIM)/Rapid Scenario Preparation Unit For Intelligence (RASPUTIN) Program: AMBER. TACSIM/RASPUTIN, is partially funded, and is a classified system, provides an interactive computer-based simulation to support Intelligence and Electronic Warfare (IEW) system development, testing, CPX, and evaluation of IEW and command, control, and communications functions. TACSIM supports intelligence training at division, corps, and echelons above corps, and the development and testing of the Army All Source Analysis System.

Signal Intelligence/Electronic Warfare Equipment Maintenance Trainer (SEMT): RED. This device is unfunded, but consists of computer repair, command and control, receiver panel, and signal processing/storage suites designed to train system level

maintenance on signal intelligence and electronic warfare collection systems. A substantial training deficiency exists in this area due to extensive upgrading of signal intelligence and electronic warfare systems.

Intelligence/Electronic Warfare Tactical Proficiency Trainer (IEWTPT): AMBER. IEWTPT is partially funded in the mid-term; however, it is required sooner. The IEWTPT is used for individual, crew, and system training on tactical signal, imagery, and human intelligence specialties. It simulates threat targets (signals/imagery/etc.) to provide the collection operators a realistic IEW environment. The Army currently has no means to simulate such an environment and thus cannot adequately train intelligence specialists.

Maneuver Battlefield Operating System: AMBER. Maneuver refers to the employment of forces through offensive or defensive operations to achieve relative positional advantage over a threat force so as to achieve tactical, operational, or strategic objectives. The commander generates combat power on the battlefield by combining the movement of combat forces and the employment of their direct fires in combination with fire support. The training devices in this program train and prepare soldiers for direct fire close combat by adding realism of force-on-force training while improving crew gunnery skills. Devices train soldiers/units to engage/destroy threat light and heavy forces through maneuver and firepower during combined arms operations in close and rear areas. Training provides balance between direct and indirect fires with ground and air platforms to achieve a lethal combined arms capability. Systems and nonsystems training devices include: Close Combat Tactical Trainer (CCTT), Multiple Integrated Laser Systems (MILES), Tank Weapons Gunnery Simulation System and Precision Gunnery System (TWGSS/PGS), Thru-Sight Video (TSV), Guard Unit Armory Device Full Crew Interactive Simulation Trainer I-Armor (GUARDFIST 1), Shoot Through Camouflage Net MILES, and Guard Unit Armory Device Full Crew Interactive Simulation Trainer-Bradley Fighting Vehicle (GUARDFIST BFV).

Figure R-10 summarizes budget, POM, and EPA capabilities for the Maneuver BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES MANEUVER BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
<u>DOES</u> CCTT (QUICKSTART) (F) MILES REPLACE (75%) TWGSS/PGS (F) TSV (PF) GUARDFIST I (PF) MILES CLAYMORE/GREN (PF) <u>DOES NOT</u> MILES REPLACE (25%) MILES CAMOUFLAGE (U) TSV (FORSCOM) (U)	<u>DOES</u> CCTT (PLT/CO) (F) MILES REPLACE (75%) TWGSS/PGS (F) TSV (PF) GUARDFIST I (PF) <u>DOES NOT</u> MILES REPLACE (25%) TSV (FORSCOM) (U) GUARDFIST BFV (U) MILES CAMOUFLAGE (U) MILES CLAYMORE/GREN(U)	<u>DOES</u> CCTT (PLT/CO) (F) MILES REPLACE (75%) TSV (PF) <u>DOES NOT</u> MILES REPLACE (25%) TSV (FORSCOM) (U)

F - Funded
U - Unfunded
PF - Partially Funded

Figure R-10

CCTT Program: GREEN. CCTT is fully funded for procurement in near-term. Using DIS architecture and protocols, CCTT is a training simulation system wherein various simulators, emulators, and semiautomated forces replicating combat vehicles, weapons systems, dismounted forces, combat support, combat service support, command and control, and opposing forces (OPFOR) elements are networked to provide fully interactive collective task training, in real time, on computer generated terrain. CCTT is to be fielded to divisions to support training at platoon through battalion task force level. In addition, CCTT Quickstart modules of M1A1 and M2A2/M3A2 Bradley Fighting Vehicles will be integrated worldwide into all fixed SIMNET-T sites to meet urgent company commander/platoon leader training requirements.

MILES Replacement: AMBER. Replacement of MILES is at 5-7 percent per year, but MILES is breaking at a rate of 10 percent per year. The program replaces the current MILES inventory. The replacement equipment procured will be MILES 2000, the objective force-on-force battlefield engagement simulator. MILES 2000 provides player identification, aspect angle kills for vehicles, and an adjustable probability of kill, all of which offer greater fidelity on the force-on-force battlefield. It is compatible with both MILES I at home stations, and MILES II SAWE-RF fielded to the CTCs.

Tank Weapons Gunnery Simulation System and Precision Gunnery System (TWGSS/PGS): GREEN. TWGSS/PGS are both fully funded. TWGSS is a vehicle-appended laser gunnery training system to simulate main gun and coaxial machine gun firing for M1-series tanks. TWGSS interfaces with the vehicle fire control system and provides a precision gunnery capability for both gunnery and tactical training. Its companion, PGS, provides the same capability for the M2/M3 Bradley Fighting Vehicle. Without TWGSS/PGS, the Army does not have a precision gunnery device for use in local training areas and on selected ranges. Mounted forces will lose the backbone of gunnery training devices which the Army Training Strategy forecasts into the next century.

Thru-Sight Video (TSV): AMBER. Partially funded. The TSV is a video recording package that records for playback the exact gunner sight picture with time tag and crew audio. TSV is required to support vehicle gunnery training for M1 series tanks and M2/M3 BFV crews. It supports evaluation and feedback of live fire engagement sequences, dry fire engagements, and subcaliber device training.

Guard Unit Armory Device Full Crew Interactive Simulation Trainer I-Armor (GUARDFIST I): AMBER. Partially funded. GUARDFIST I is installed on a static tank at an RC unit's armory. GUARDFIST I provides real time interaction with aural cues and visual scenes responding to each crewman's actions, thus allowing crews to simulate firing and full crew drills. An immediate need exists within RC units; crewmen must acquire and sustain tank skills proficiency. This is the only currently available device that permits full crew, on tank, interactive, multitask training for armor crewmen.

MILES M18 Claymore Mine: RED. Unfunded in mid-term. The MILES Claymore simulates the M18A1 Claymore Mine effects in a tactical engagement simulation exercise. There is currently no means to evaluate the casualty producing effects of the M18A1 antipersonnel mine during force-on-force training. This device also supports MOUT and SOF training.

MILES Hand Grenade: RED. Unfunded in mid-term. The MILES Hand Grenade simulates grenade effects in a tactical engagement simulation exercise. We need a hand grenade training device that interfaces with MILES for force-on-force tactical engagement exercises to provide an objective means of casualty assessment. This device also supports MOUT and SOF training.

Shoot Through Camouflage Net MILES: RED. Unfunded. The MILES Shoot Through Camouflage Net provides camouflage netting with MILES receiver/transmitter relays which allow MILES equipped weapons to realistically engage and destroy equipment covered by these nets. A recurring limitation of the MILES-based system is the inability of units to deploy camouflage nets during training.

Guard Unit Armory Device Full Crew Interactive Simulation Trainer - Bradley Fighting Vehicle (GUARDFIST BFV): RED. Unfunded. GUARDFIST BFV will be a full crew, part task gunnery training device for use by RC units. Appended to the actual

vehicle, the device provides crews a wide range of engagement scenarios and fills a critical need for RC units to conduct BFV crew training at their local armory.

Aviation Battlefield Operating Systems: AMBER.

Aviation's mission is to find, fix, and destroy the enemy through fire and maneuver, and to provide Combat Support (CS) and Combat Service Support (CSS) in coordinated operations. Aviation uses both fixed and rotary wing aircraft to accomplish its missions. While *FM 100-5* groups aviation under the Maneuver BOS, it is addressed separately here. Systems and nonsystems training devices include: Aviation Combined Arms Tactical Trainer (AVCATT) and MILES Air to Ground Engagement System II (AGES II).

Figure R-11 summarizes budget, POM, and EPA capabilities for the Aviation BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
AVIATION BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES MILES AGES II (PF)	**DOES**	**DOES** AVCATT (PF)
DOES NOT AVCATT (U) MILES AGES II (OH-58D) (U)	**DOES NOT** AVCATT (U) MILES AGES II (PF)	**DOES NOT** MILES AGES II (PF)

F - Funded
U - Unfunded
PF - Partially Funded

Figure R-11

AVCATT Program: AMBER. Partially funded in far-term. Using DIS architecture and protocols, AVCATT is a training simulation system composed of networked helicopter simulators and semiautomated forces workstations. The simulators provide collective task training for crew and platoons in aerial attack and air cavalry organizations. Friendly and OPFOR ground forces, provided by emulators and semiautomated forces, give commanders and crews a computer-generated, combined arms environment. Additionally, AVCATT can be linked with the other CATT systems to provide true combined arms interaction.

MILES Air to Ground Engagement System II (AGES II): AMBER. Partially funded. The AGES II system is an addition to the MILES force-on-force training system, integrating the AH-64, OH-58D, CH-47D, UH-60 Hellfire Ground Support System (HGSS), and a controller device. AGES II augments the MILES training capability by incorporating additional corps/division aviation assets into the training environment.

Fire Support Battlefield Operating Systems: AMBER.

Fire support is the collective and coordinated employment of the fires of armed aircraft, land- and sea-based indirect fire systems, and electronic warfare systems against ground targets to support land combat operations at both the operational and tactical levels by delaying, disrupting, or destroying enemy forces, combat functions, and facilities. The devices in this program support training combined arms and fire support assets in employment of close support to destroy, degrade, and delay the enemy through combined arms operations. These devices enhance unit skills and abilities in gunnery and employment of direct and indirect fires from ground and air platforms in combined arms operations to detect, identify, suppress, neutralize, and destroy threat forces and aircraft. They train combined arms maneuver forces in employment and effects of indirect fires, mines, and chemical munitions in a combat-like environment with minimal risk and less consumption of OPTEMPO, ammunition, and resources. Systems and nonsystems training devices include Fire Support Combined Arms Tactical Trainer (FSCATT), Simulation of Area Weapons Effects-Radio Frequency (SAWE-RF), and Guard Unit Armory Device Full Crew Interactive Simulation Trainer II - Field Artillery (GUARDFIST II).

Figure R-12 summarizes budget, POM, and EPA capabilities for the Fire Support BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
FIRE SUPPORT BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES FSCATT (PF) SAWE-RF (CTC) (F) GUARDFIST II (PF) **DOES NOT** SAWE-RF (ARMY-WIDE) (U)	**DOES** FSCATT (PF) SAWE-RF (CTC) (PF) **DOES NOT** SAWE-RF (ARMY-WIDE) (U) GUARDFIST II (U)	**DOES** FSCATT (PF) **DOES NOT** SAWE-RF (ARMY-WIDE) (U) GUARDFIST II (U)

F - Funded U - Unfunded PF - Partially Funded

Figure R-12

FSCATT Program: AMBER. Partially funded The FSCATT program has two phases. Phase I addresses the crew level gunnery training requirement formerly known as the Closed Loop Artillery Simulation System (CLASS). It will train the entire field artillery gunnery team: forward observer, fire direction center, and howitzer crew using a combination of desktop computers, actual equipment, strap-on devices, and Howitzer Crew Trainer (HCT) simulator modules. In Phase II, the HCTs are linked to form collective training sites for self-propelled artillery units. The program is rated **AMBER** because Phase I is only partially funded, and Phase II is unfunded.

Simulation of Area Weapons Effects-Radio Frequency (SAWE-RF): AMBER. Partially funded. SAWE-RF is a command and control system used in tactical engagement simulation training exercises at the CTCs and local training areas. Linked with both MILES 2000 and MILES II, it accurately simulates in real time the vulnerabilities of personnel and vehicles to direct and indirect fire and surface area weapons. We have a critical need for a training system that accurately simulates the effects of field artillery, naval gunfire, mortars, close air support, mines, and nuclear, biological, and chemical fires.

Guard Unit Armory Device Full Crew Interactive Simulation Trainer II - Field Artillery (GUARDFIST II): AMBER. Partially funded in near-term. GUARDFIST II provides battlefield scenarios to train field artillery observers. It uses computer-generated graphics and an audio system to simulate the sights and sounds of the battlefield. It also provides a record of student performance for AARs. Due to armory dispersion, costs, and time constraints, adequate training cannot be provided to RC forward observers without this device.

Mobility/Survivability Battlefield Operating System: RED.

Mobility operations preserve the freedom of maneuver of friendly forces. The missions include breaching enemy obstacles, increasing battlefield circulation, improving existing roads or building new ones, providing bridge and raft support for crossing rivers, and identifying routes around contaminated areas. Survivability operations protect friendly forces from the effects of enemy weapons systems and from natural occurrences. The program includes devices, simulators, and simulations which provide realistic means to train forces to deal with, operate in, and survive the effects of smoke and chemical, nuclear, and biological weapons. The devices improve knowledge and skills needed to reduce vulnerability of personnel and equipment to the adverse effects of hazardous environmental conditions as well as ballistic, flame, and directed energy weapons. This program provides training needed for offensive/defensive exploitation of such weapons effects during combat operations. Devices are also needed to train engineer forces in constructing protective positions and provide obscuration training to enhance our capability to defend our forces. System and nonsystem training devices include: Engineer Combined Arms Tactical Trainer (ENCATT), Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution (PCAS/CADS), Biological Agent Simulant/Biological Agent Decontamination Simulant (BAS/BADS) and Projected Smoke Simulator (PSS).

Figure R-13 summarizes budget, POM, and EPA capabilities for the Mobility/Survivability BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES MOBILITY/SURVIVABILITY BOS		
Near-term (FY 95-96)	Mid term (FY 97-00)	Far-term (FY 01-09)
DOES	DOES ENCATT (PF) PCAS/CADS (F)	DOES ENCATT (PF) PCAS/CADS (F)
DOES NOT ENCATT (U)	DOES NOT BAS/BADS (U) PSS (U)	DOES NOT BAS/BADS (U) PSS (U)

F - Funded U - Unfunded PF - Partially Funded

Figure R-13

ENCATT Program: AMBER. It is partially funded, but not until the far-term. Using DIS architecture and protocols, ENCATT builds upon the CATT battlefield by providing realistic mobility, countermobility, and survivability functions. ENCATT's most significant attribute is its dynamic terrain; it allows engineer vehicle simulators to "dig" trenches in the computer terrain database. The dynamic terrain also allows collective engineer task training, such as bridge construction, laying minefields, or creating obstacles. As with the other CATT simulations, ENCATT generates its own combined arms forces and OPFOR through emulators and semiautomated forces or links with other CATT sites to provide a true combined arms battlefield.

Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution (PCAS/CADS): GREEN. The PCAS/CADS system is funded and consists of a persistent chemical agent simulant and a chemical agent disclosure solution, both of which provide realistic chemical/biological agent detection, decontamination, and casualty assessment capabilities for force-on-force.

Biological Agent Simulant/Biological Agent Decontamination Simulant (BAS/BADS): RED. BAS/BADS is currently unfunded and it simulates threat biological agents, providing a realistic training environment for simulation exercises. BAS replicates the physical cues associated with a biological agent attack and is used in

conjunction with BADS for training decontamination operations associated with biological contamination. No other simulant exists for biological warfare training.

Projected Smoke Simulator (PSS): RED. PSS is currently in the concept exploration phase is unfunded. It simulates/ replicates projected smoke (indirect fire) during force-on-force exercises. PSS also incorporates a whistle/bang device to simulate the sound of incoming artillery rounds..

Air Defense Battlefield Operating System: AMBER.

Air defense provides the force protection from enemy air attack, prevents threat from separating friendly forces, and frees the commander to fully synchronize maneuver and firepower. The system and nonsystem training devices for air defense include: Air Defense Combined Arms Tactical Trainer (ADCATT), and MILES-Air Defense (AD).

Figure R-14 summarizes budget, POM and EPA capabilities for the Air Defense BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
AIR DEFENSE BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES	**DOES**	**DOES**
		ADCATT (PF)
DOES NOT	**DOES NOT**	**DOES NOT**
ADCATT (U)	ADCATT (U)	

F - Funded U - Unfunded PF - Partially Funded

Figure R-14

ADCATT Program: RED. It is partially funded, but not until the far-term. Using DIS architecture and protocols, ADCATT provides collective task training for air defense units. Built upon CCTT and AVCATT, ADCATT provides simulators and emulators of air defense weapons used on the combined arms battlefield, including vehicles, weapons systems, combat support, and combat service support emulators and Semi-Automated Forces (SAF). ADCATT fully interacts with the other CATT systems to train air defense personnel in combined arms operations.

Logistics Battlefield Operating System: AMBER.

Logistics provides the physical means with which forces operate, from the production base and replacement centers in the U.S., to soldiers in contact with the enemy. Logistics is the process of planning and executing the sustainment of forces in support of military operations. It includes the design, development, acquisition, storage, movement, equipping, distribution, and evacuation functions of supply, field services, maintenance, health service support, personnel, and facilities. The devices teach the combat service support skills/tasks needed to sustain forces in combat. Devices support training/instruction to operate, service, troubleshoot equipment, isolate equipment faults, and maintain equipment, vehicles, ammunition, etc. Training aids, devices, simulators, and simulations provide safe, cost effective, hands-on training to perform difficult/hazardous repair/maintenance tasks, most of which are not otherwise possible without considerable cost and risk to soldiers and actual equipment. Training with such devices improves experience and skills without expenditures of resources; in turn, knowledge gained improves our ability to sustain our forces. The primary system for logistics training is the Combat Service Support Training Simulation System (CSSTSS).

Figure R-15 summarizes budget, POM, and EPA capabilities for the Logistics BOS using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
LOGISTICS BOS

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES	**DOES**	**DOES**
CSSTSS (F)	CSSTSS (F)	CSSTSS (F)
DOES NOT	**DOES NOT**	**DOES NOT**

F - Funded U - Unfunded PF - Partially Funded

Figure R-15

Combat Service Support Training Simulation System (CSSTSS) Program: AMBER. CSSTSS fielding has slipped and is not now expected to be ready until FY 96. It is a computer-based training simulation which provides training opportunities for CSS commanders and staffs from theater Army level to battalion level. The system simulates CSS command and control activities in a realistically simulated, stressful environment representative of the modern battlefield.

The Combat Training Center (CTC) Program: The CTC Program is the centerpiece of the Army's collective training. It includes the National Training Center (NTC), the Joint Readiness Training Center (JRTC), the Combat Maneuver Training Center (CMTC) and the Battle Command Training Program (BCTP). The NTC, JRTC, and CMTC train brigade level units; the Centers have large, instrumented maneuver areas with observer/controllers (O/Cs) and highly skilled Opposing Forces (OPFOR); these exercise units in realistic force-on-force engagements and live fire exercises. Units deploy to these centers; there, soldiers and systems experience the rigors of combat, as closely as they can be replicated, in training environments. Army training needs are inextricably supported by the instrumented battlefields of the CTCs. **Modernized systems must be delivered with the components needed for them to be fully integrated into the CTC battlefield.** The CTC Program is critical to making the CTC battlefield fully instrumented, providing the ability to record, assess, and replay through After Action Reviews (AAR), complex battlefield dynamics. It is here that the lessons learned ensure success and save lives on future battlefields.

Figure R-16 summarizes budget, POM, and EPA capabilities for the Joint Readiness Training Center using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES
JOINT READINESS TRAINING CENTER

Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES OBJ INSTR SYS, Phase I (PF) MOUT FORCE-ON-FORCE (PF)	DOES MOUT FORCE-ON-FORCE (PF) LIVE FIRE (PF)	DOES AV/INTEG (F) LIVE FIRE (F)
DOES NOT LIVE FIRE (U)	DOES NOT	DOES NOT

F - Funded U - Unfunded PF - Partially Funded

Figure R-16

Joint Readiness Training Center (JRTC) Program: AMBER.

JRTC trains light infantry brigade task forces, Special Operations Forces, and Air Force combat and airlift units in low to mid intensity conflict (to include peace-enforcement) scenarios. JRTC integrates advanced technology, instrumented maneuver areas with

observers/controllers, and a dedicated and highly skilled OPFOR to exercise units in realistic force-on-force engagements, Military Operations in Urban Terrain (MOUT), and live fire exercises. With emphasis on contingency operations, JRTC offers excellent joint training opportunities involving Navy, Marine, and Air Force assets. JRTC is located at Fort Polk, LA.

JRTC Objective Instrumentation: AMBER. This system is partially funded. It is a computer-controlled training system which provides a full data collection and feedback capability, including all hardware and software necessary to provide data collection, processing for presentation, and feedback to units training at JRTC. The JRTC Objective Instrumentation consists of a Core Instrumentation Subsystem (CIS), a Range Data Measurement Subsystem (RDMS), a Range Monitoring and Control Subsystem (RMCS), and an AAR.

Aviation/Integration: AMBER. Funded in the far-term. JRTC Aviation/Integration consists of MILES force-on-force devices for special operations forces aircraft, close air support aircraft, AC-130 aircraft, C-130 transports, and other auxiliary equipment necessary to support realistic training of special operations and/or light forces, including complete instrumentation and integration with the vertical target engagement system.

Live Fire Objective: AMBER. The program is partially funded. It is designed to provide full instrumentation and integration of vertical and ground targetry systems in support of company level force-on-force exercises, consisting of six platoon live fire lanes, including platoon ambush lanes. Real time feedback is provided through integration and presentation of data in fixed and mobile AAR facilities.

Military Operations in Urbanized Terrain (MOUT) Force-on-Force: AMBER. Unfunded for the procurement of the camera system. MOUT training facilities, to be built at the JRTC, include the unique capability to conduct an instrumented live fire exercise at platoon level, as well as force-on-force training at company and higher levels. Cameras in buildings and along streets capture actions to provide immediate feedback/lessons learned to player units. The JRTC MOUT complex currently envisioned will support a battalion task force in a force-on-force exercise. The CTC MOUT complex consists of a collective training facility of 32 buildings for force-on-force training with an eight building village for live fire training, an air force control tower, and an airfield.

National Training Center (NTC): AMBER.

The NTC trains the Army's mechanized and armor brigade level units in scenarios that depict mid to high intensity combat. Located at Fort Irwin, CA, the NTC emphasizes heavy/light forces, incorporation of contingency forces, and the integration of special operations forces into dedicated contingency training rotations. The NTC integrates advanced technology, instrumented maneuver areas with O/Cs, and a dedicated and highly skilled OPFOR to exercise units in realistic force-on-force engagements and live fire exercises.

Figure R-17 summarizes budget, POM, and EPA capabilities for the National Training Center using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES NATIONAL TRAINING CENTER		
Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES RDMS (F) DOES NOT LIVE FIRE MOD (U) WOUNDED IN ACTION (U) CONTROLLER GUN (U)	DOES OBJ INSTR SYS (F) DOES NOT LIVE FIRE MOD (U) WOUNDED IN ACTION (U) CONTROLLER GUN (U)	DOES OBJ INSTR SYS (F) DOES NOT LIVE FIRE MOD (U) WOUNDED IN ACTION (U) CONTROLLER GUN (U)

F - Funded **U - Unfunded** **PF - Partially Funded**

Figure R-17

NTC Objective Instrumentation System: AMBER. The upgrade of the digitized AAR recording system is being canceled. The NTC Objective Instrumentation System offers a full brigade instrumentation system. Without funding, there will be no such system nor instrumentation in the expanded NTC maneuver areas.

Range Data Measurement Subsystem (RDMS): GREEN. It is fully funded. The RDMS is a communications system used to collect data generated by the players and passed along with position location data to the core instrumentation system for processing and display.

Other programs--Live Fire Modernization, Wounded in Action, and Controller Gun--are **RED** due to lack of funding.

Combat Maneuver Training Center (CMTC): GREEN.

The program is fully funded and functional. The CMTC at Hohenfels Major Training Area (MTA), Germany, provides CTC training experiences for USAREUR's forward deployed maneuver brigades in force-on-force and MOUT scenarios against a dedicated and skilled OPFOR. CMTC integrates advanced technology, instrumented maneuver areas with O/Cs, and an OPFOR to exercise units on the most realistic European battlefields possible. Hohenfels MTA is one of the last U.S. forces training areas in Europe capable of supporting battalion level maneuvers.

Battle Command Training Program (BCTP): GREEN.

The BCTP at Fort Leavenworth, KS, is fully funded and uses advanced simulations to train Army corps and division commanders and their battle staffs in mid to high intensity conflict scenarios. The BCTP consists of two parts:

- A five day seminar for commanders and their battle staffs to conduct doctrinal reviews and a war gaming practical exercise.

- A five to seven day CBS-driven CPX called "Warfighter."

Battle Command Training Program After Action Review (BCTP AAR): AMBER. It is partially funded, but not until mid to far terms). The BCTP AAR provides an automated means to capture and analyze exercise data and present comprehensive reviews of simulated exercises. Enhanced AAR facilities will permit automation of feedback and data collection for division/corps CPXs; this will reduce supporting workload and manpower requirements, and enhance the realism of training experienced by player/tested units. The system will be compatible with CBS and components of the CBS AAR suite.

Training Ammunition: GREEN. Training ammunition provides units the ability to meet the training standards outlined in CATS. Tough, realistic training hinges on the effective and efficient use of training ammunition. Commanders and their staffs must develop and execute sound training ammunition programs to ensure their soldiers and units are fully capable of decisively engaging threat targets with all their weapon systems. FY 96 is fully funded. FY 97-01 are funded at 80%. Over the POM 96-01 period, tank ammunition is fully supported through a cost effective multiyear procurement program. Training for Apache, Bradley, and MK-19 is at 85-95%. Other training ammunition items are supported at below 80%. To offset training ammunition procurement shortfalls, the Army adopted a risk strategy of drawing down selected training standard items (those also used in war). This area is rated **GREEN** in the near-term, going to **AMBER** in the mid- and far-terms.

Figure R-18 summarizes budget, POM, and EPA capabilities for Training Ammunition using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES TRAINING AMMUNITON		
Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
<u>DOES</u> TANK BRADLEY APACHE ARTILLERY MORTAR SMALL ARMS DEMO PYRO <u>DOES NOT</u>	<u>DOES</u> TANK ARTILLERY <u>DOES NOT</u> SMALL ARMS DEMO PYRO BRADLEY APACHE MORTAR	<u>DOES</u> TANK <u>DOES NOT</u> SMALL ARMS DEMO PYRO BRADLEY APACHE MORTAR ARTILLERY

F - Funded U - Unfunded PF - Partially Funded

Figure R-18

Near-Term: AMBER. Congressional increases to ammunition procurement in FY 95 combined with contributions from the ammunition war reserve account supports ammunition requirements 100%.

Mid- and Far-Terms: AMBER. Funding levels in the mid- and far-terms do not fully support requirements for training ammunition. Declining contributions from the war reserve account, increasing costs of training ammunition items resulting from weapon systems modernization, and affordability constraints throughout the Army limit the ability to support training ammunition in the outyears.

Land, Ranges, Targets and Environment: AMBER.

It is partially funded for PRIME and AITST. This program provides procurement and installation of targetry, instrumentation, devices, and other range-related hardware. It supports Army range modernization requirements in accordance with the Army Master Range Plan; e.g., to optimize individual/collective skills to synchronize and employ combined arms assets through realistic live fire/nonlive fire training exercises. The devices create a lethal combined arms environment; it challenges commanders, other leaders, and soldiers against a low, mid, and high intensity combat conditions; and it tests/develops/sustains proficiency in individual/collective skills through automated evaluation and scoring/feedback mechanisms. Such devices enhance training efficiency and effectiveness, and conserve OPTEMPO, ammunition, and personnel resources.

Figure R-19 summarizes budget, POM, and EPA capabilities for Land, Ranges, Targets, and Environmental Issues.

BUDGET, POM, AND EPA CAPABILITIES LAND, RANGES, TARGETS, AND ENVIRONMENT		
Near-term (FY 95-96)	Mid-term (FY 97-00)	Far-term (FY 01-09)
DOES RETS/PRETS (F) PRIME (F)	DOES RETS/PRETS (F)	DOES RETS/PRETS (F)
DOES NOT AITST (U)	DOES NOT AITST (U) PRIME (PF) LOMAH (U)	DOES NOT AITST (U) PRIME (PF)

F - Funded **U - Unfunded** **PF - Partially Funded**

Figure R-19

Remoted Target System (RETS): GREEN. It is fully funded through the far-term. RETS is a standard marksmanship and gunnery range targetry system, including target lifting mechanisms, target moving devices, controlling devices/computer system, simulators, and interfacing devices. The Army's current range mechanisms for marksmanship and gunnery ranges are rapidly becoming obsolete. Many ranges are maintenance liabilities and, with few exceptions, do not provide for realistic threat-oriented training. Target control systems are likewise nonstandard and are rapidly becoming unserviceable and obsolete. RETS enhances training by providing trainers/commanders facilities that replicate battlefields. The entire RETS system and new targeting technology was reviewed, resulting in adaptation of more effective equipment.

Precision Range Integrated Maneuver Exercise (PRIME): AMBER. It is partially funded in mid- and far- terms. PRIME is a range system that allows event driven scenarios to generate freeplay exercises in an instrumented maneuver area. Armor and mechanized infantry units especially need a tactical training system that supports the principle of "train, critique, and train." PRIME satisfies this need; it provides video and audio replay of training sequences for use in on-site AARs. PRIME also offers collective training, through company level, for combined arms team engagement of enemy forces with direct fire. PRIME has been installed at Ft. Hood, TX. It will be fully evaluated in 3Q FY 95. Currently there is no programmed funding for procuring additional sets.

Armor Integrated Thermal Signature Target (AITST): RED. The system is currently unfunded. AITST realistically depicts both threat and friendly vehicles, allowing crew/gunners using thermal sights to distinguish them, and hence to acquire and engage threat vehicles. A scoring system provides accurate scoring and feedback during live fire and laser gunnery exercises. Current targets are nonstandard and constructed from a variety of materials. A critical need exists for full scale targets that depict both threat and friendly vehicles. Without these targets, the Army does not have standardized thermal targets which replicate OPFOR thermal signatures. Most significantly, lessons learned in the aftermath of Operation Desert Storm with respect to fratricide will not be taught.

Location of Hit and Miss (LOMAH): RED. It is unfunded for procurement. LOMAH is an electronic downrange feedback system that detects, records, and displays the location of each round on or off the target surface. Marksmanship research conducted since 1978 concludes that the lack of feedback is a very serious flaw in current Army marksmanship training. LOMAH also eliminates target inspections and thus increases training/firing time. Combining precise bullet location feedback with increased firing time will appreciably enhance marksmanship.

Portable Remoted Target System (PRETS): GREEN. It is fully funded through far-term. PRETS is a computerized, fully duplexed, radio frequency communications network between range operators and downrange hardware. It interfaces directly with the standard RETS targetry RCS and/or a personal computer. PRETS operates a totally portable range with the same degree of flexibility as the standard RETS range.

Training Land Initiatives: AMBER. Battlefield commanders manage a three-dimensional training battlefield that includes artillery, missiles, and attack and assault helicopters combined with Air Force close air support. Maneuver units need as much space to fire and maneuver in training as they would use in combat.

- Weapons firing at optimum ranges require large areas of contiguous land (to contain fired ordnance).
- Force deployment and maneuver require significant areas of continuous land.
- Land **stewardship** assures continued use of limited training lands.
- Land rehabilitation and maintenance.
- Land restoration.
- Environmental **constraints** impact the availability of land.
- Endangered species.

- Wetlands.
- Soil erosion.
- Focus **land acquisition to limited sites** which support brigade level training.
- Major training areas - Yakima Firing Center, WA, and Hunter-Liggett Military Reservation, CA.
- Combat Training Centers - Fort Irwin, CA, and Fort Polk, LA.

Other Special Programs: These include LAM TF, Distributed Interactive Simulation (DIS), and Regional Training Sites. Figure R-20 summarizes budget, POM, and EPA capabilities for Other Special Programs using a DOES/DOES NOT format.

BUDGET, POM, AND EPA CAPABILITIES OTHER SPECIAL PROGRAMS		
Near-term (FY 95-96)	**Mid-term (FY 97-00)**	**Far-term (FY 01-09)**
DOES	**DOES**	**DOES**
LAM TF (F)	**LAM TF (F)**	**LAM TF (F)**
DIS (PF)	**DIS (PF)**	**DIS (PF)**
RTS (F)	**RTS (F)**	**RTS (F)**
DOES NOT	**DOES NOT**	**DOES NOT**

F - Funded **U - Unfunded** **PF - Partially Funded**

Figure R-20

Louisiana Maneuvers Task Force (LAM TF): GREEN. It is fully funded through far-term. LAM TF coordinates the efforts of the Army leadership to integrate lessons learned from exercises, ongoing operations, laboratory experiments, and simulations in a rational, structured way and facilitates bringing new insights to the senior leadership for informed policy deliberations.

Distributed Interactive Simulation: AMBER. It is partially funded through far-term. This program develops software and buys hardware to link manned simulators to higher level war game simulations. It establishes protocols and architecture for common use of terrain and other database by simulators and simulations.

Regional Training Sites (RTS): GREEN. It is fully funded through far-term. RTSs provide support for facilities, equipment, system components, and Reserve Component (RC) training. The RTS program enables the Army to mobilize and deploy RC maintenance units capable of supporting current and force modernization systems on the battlefield, thus providing centralized locations to concentrate equipment, training devices, technical manuals, test sets, and special tools to train RC maintenance soldiers in military occupational specialties sustainment and transition. Twenty-one RTSs are planned, including two high tech RTSs, one of which is already operational at Fort Dix, NJ.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

TADSS developed and procured through the TMA remain critical to Army readiness as the Army continues the transition to the Base Force. The primary method of acquiring TADSS is through the research, development, and acquisition process. However, some training equipment requirements can and have been met by procuring Commercial Off-the-Shelf (COTS) and NonDevelopmental Items (NDI). The Army will leverage emerging technologies from civilian corporations, research agencies, and U.S. Army Battle Lab experiments. Modernization of the Army through horizontal integration of technologies will increase the lethality, versatility, deployability, survivability, and affordability of Army weapon systems. Technology exploitation will improve training and readiness to ensure our soldiers are the most capable, highly trained Army on the battlefield. TADSS contribute to an expanded range of training capabilities, including:

- Providing realistic force-on-force training opportunities by upgrading and fielding MILES Army-wide;

- Providing soldiers, leaders, and units improved training evaluations and feedback by fielding upgraded instrumentation systems to the Army's premier practice fields--the Combat Training Centers (CMTC, NTC, JRTC);

- Providing a network of vehicle and weapons simulators that allow units to conduct and sustain combined arms tactical training with crew through battalion/task force level simulation exercises;

- Providing battle simulations that depict realistic battlefield environments, allowing commanders and staffs to practice command and control, synchronize combat power and employ combined arms teams against a credible, thinking opponent; and

- Providing devices that realistically train tasks that might otherwise be too costly, difficult, or unsafe to train with actual equipment.

Figures R-21 through R-32 depict the TMA's current Research, Development, and Acquisition (RDA) strategy by BOS.

RDA STRATEGY

BATTLE COMMAND BOS

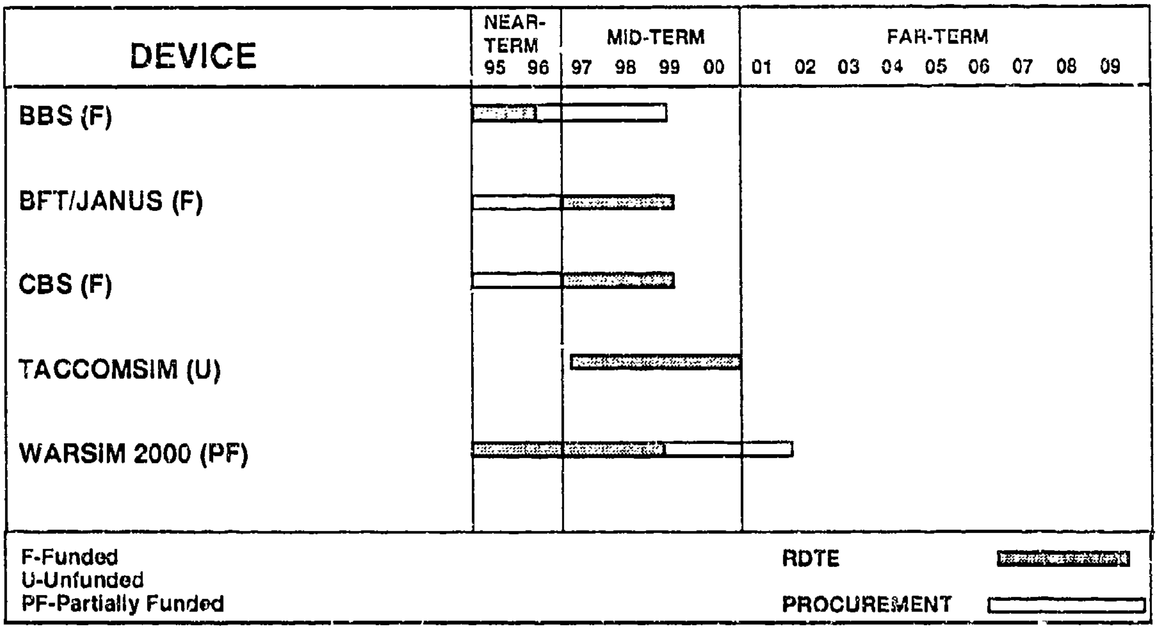


Figure R-21

INTELLIGENCE BOS

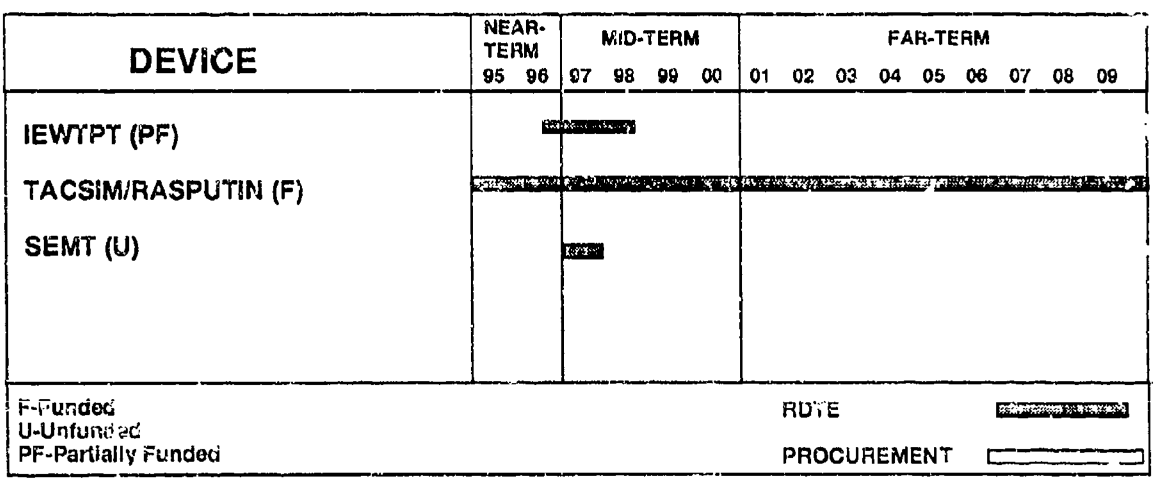


Figure R-22

MANEUVER BOS

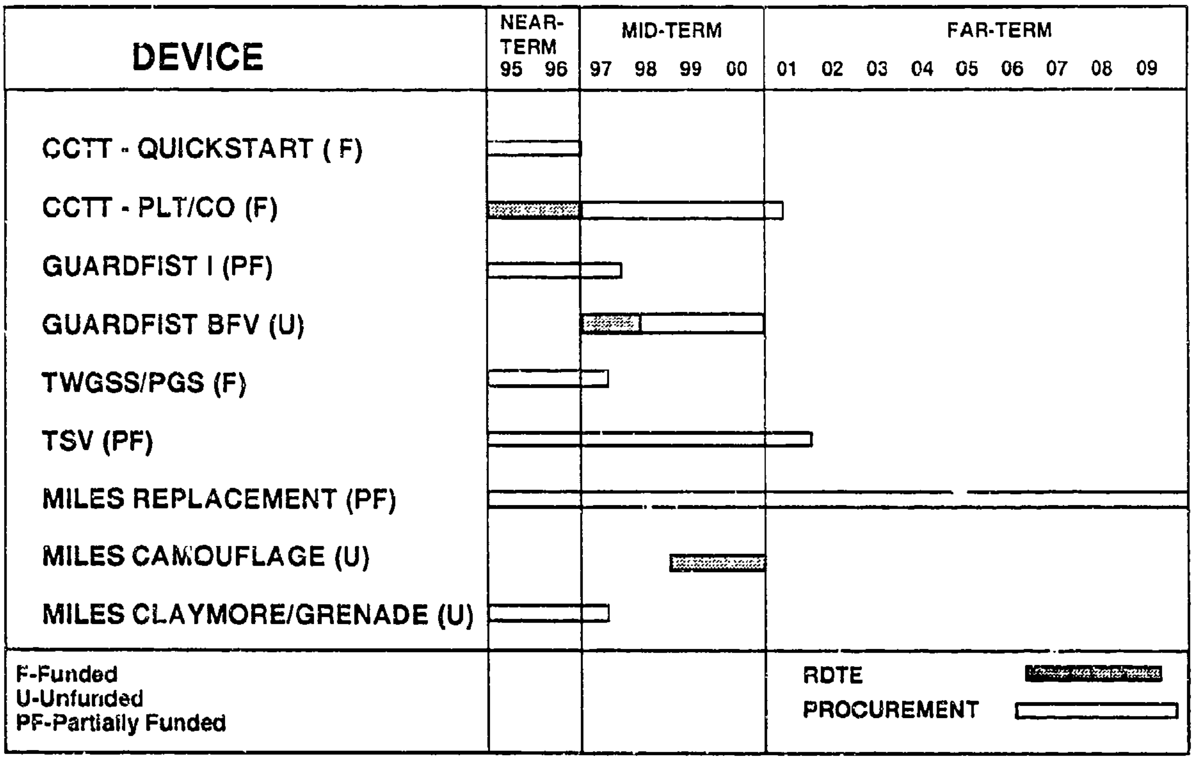


Figure R-23

AVIATION BOS

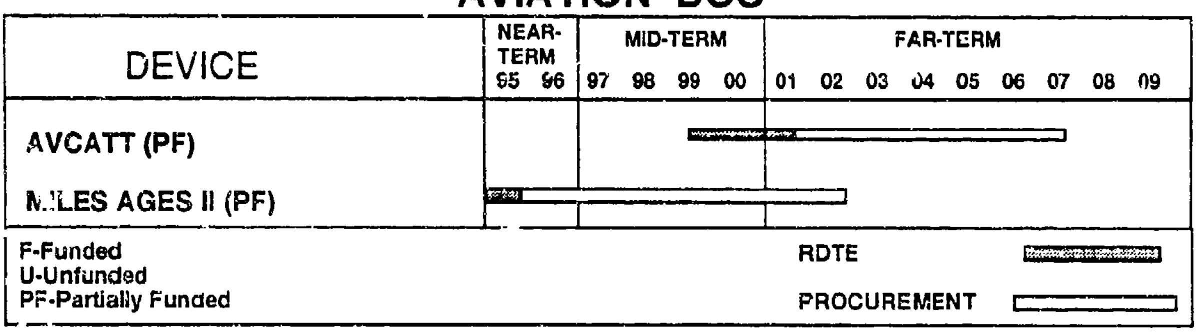


Figure R-24

FIRE SUPPORT BOS

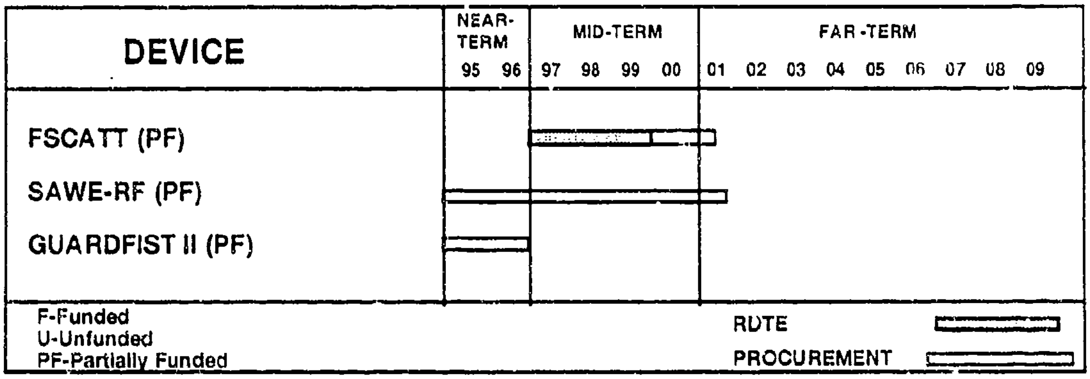


Figure R-25

MOBILITY/SURVIVABILITY BOS

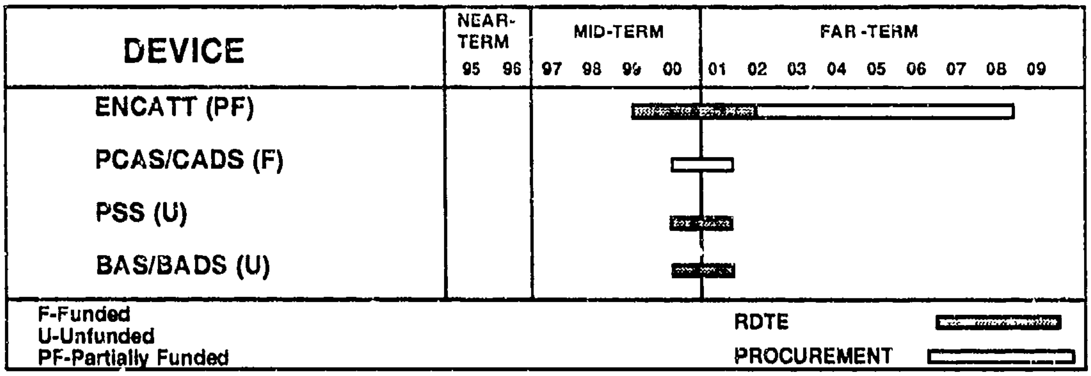


Figure R-26

AIR DEFENSE BOS

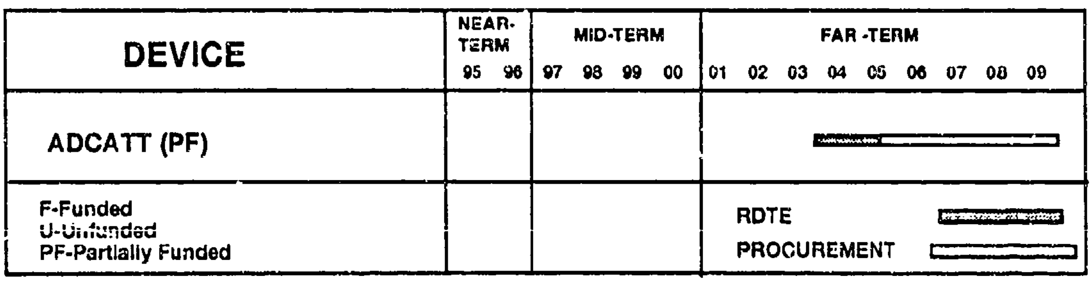


Figure R-27

LOGISTICS BOS

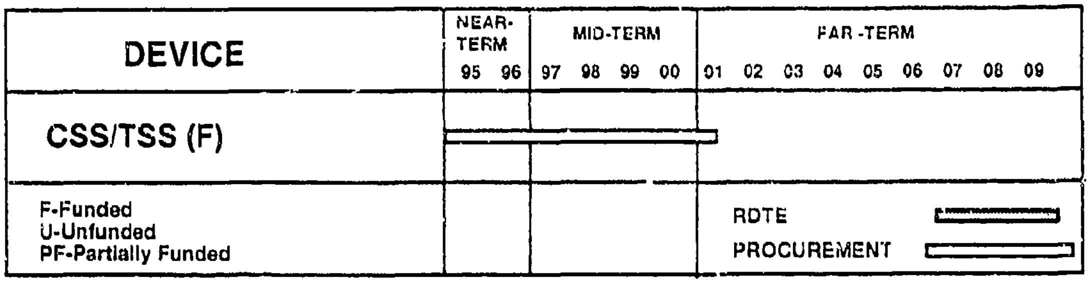


Figure R-28

JOINT READINESS TRAINING CENTER

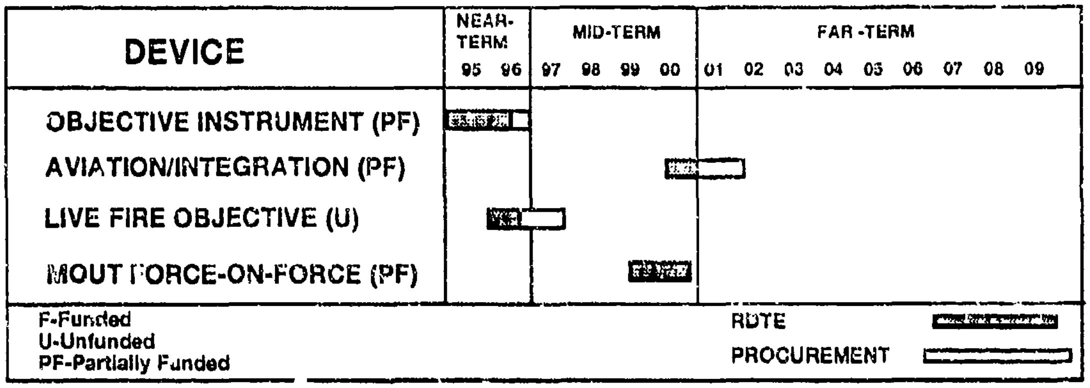


Figure R-29

NATIONAL TRAINING CENTER

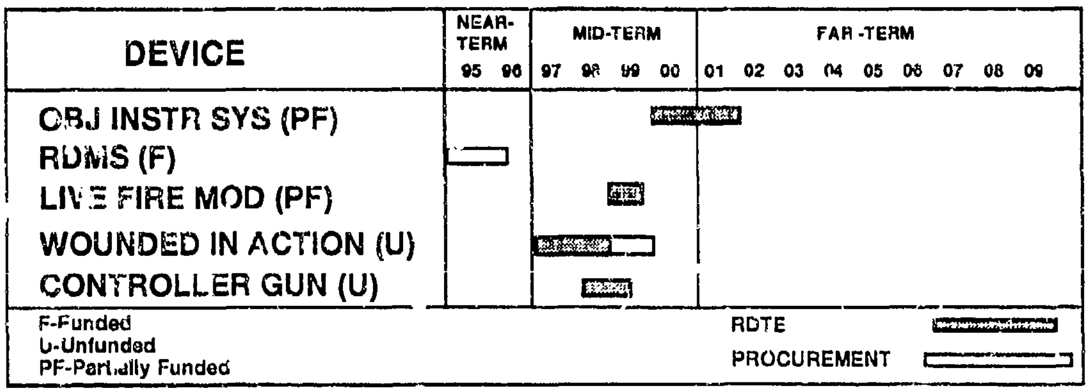


Figure R-30

LAND, RANGES, TARGETS, AND ENVIRONMENT

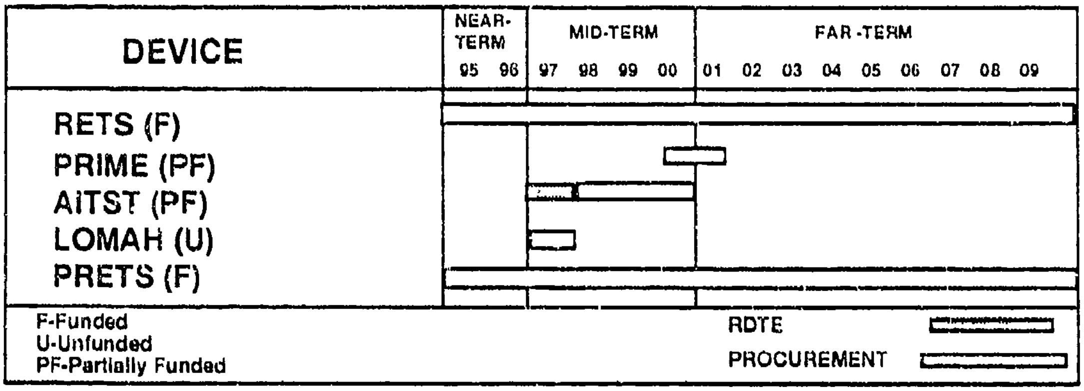


Figure R-31

OTHER SPECIAL PROGRAMS

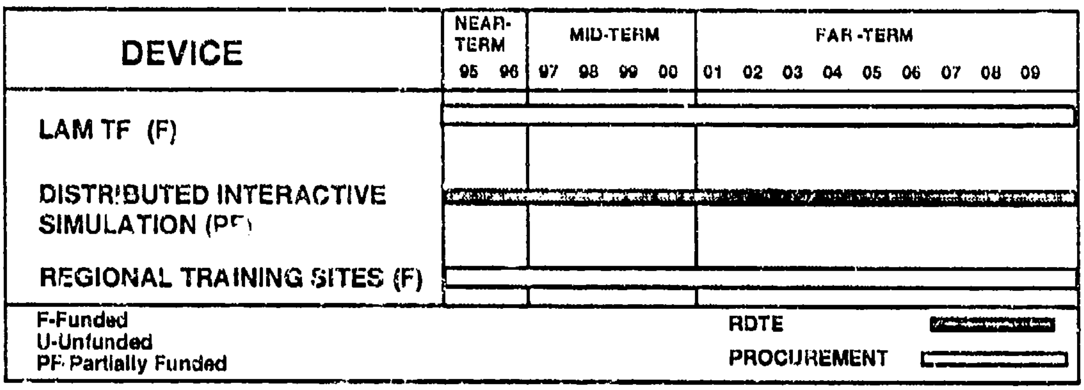


Figure R-32

Training Research and Development, Future Acquisition Strategy

The sophistication, complexities, escalating operating costs, and increasing lethality of modern weapons systems, plus the need to learn how to best fire and fight them, from individual soldier to commander, and to synchronize combat systems--from the Army, Navy, Air Force, whether Active or Reserve component--in fast-moving, three dimensional, dispersed battles, creates the demand for simulation-based training to replace or augment field and range training. Simulation-based training is the primary training vehicle from brigade to echelons above corps level forces. The training envisioned for the year 2000 and beyond is encompassed by Synthetic Theater of War (STOW). STOW provides a seamless simulation environment that links actual combat systems on the ground, manned simulators, and other simulations together on a common, virtual battlefield. The simulated warfighting environment can be tailored to meet user training requirements.

Incorporating training requirements early in the systems acquisition process benefits the Army; it streamlines the acquisition process for training systems, and training systems embedded within the combat system design reduce total system cost. The emphasis on value engineering, top-down training strategies, and Manpower and Personnel Integration (MANPRINT) requirements also reinforce the need to completely describe weapons and training systems **up front.** Technology challenges both weapons and training systems in common ways; thus, simultaneous, or at least concurrent, development of both can produce effective, timely training systems. Moreover, technology imposes a number of other challenges:

- Distributed Interactive Simulation--Large scale, real time networking uses long haul data networks to link equipment, simulators, and simulations at geographically separate sites;

- Knowledge representation--Artificial intelligence that builds from a knowledge base by representing expert knowledge with a rule structure;

- Low cost computer image generation;

- Rapidly configurable and digitized terrain databases that allow development of geospecific terrain photo-based images;

- Reconfigurable Simulators--Test beds use modular hardware and software simulator designs to rapidly construct prototype simulators and advance artificial intelligence technologies; and

- Fiscal constraints and future force levels mean technologies with high payoff potential will receive funding priority. New system development will decrease. Technology insertions will modernize current combat and training systems.

Future training technology initiatives with high payoffs (i.e., those that reduce resource consumption) and provide training force multipliers will receive high priority for funding.

The Army will continue to examine methods to improve training. Future training will use innovative technologies to improve readiness. Our challenge is to train and sustain the most combat ready and deployable force in the world. The Army must look to research and development initiatives to identify technology that may offset decreasing force structure and ensure the means of providing realistic, dynamic training to our soldiers--today and tomorrow.

Army Science and Technology Training Program

Synthetic training environments provide the opportunity to enhance training effectiveness while reducing training resource costs. Advances in the behavioral sciences are, however, required to provide empirically-based training strategies that lead to the most efficient and cost effective use of new training technologies. A major goal of Army's training research program is to improve combat readiness and performance across the full range of Army missions through research on individual and collective (unit) training. A complete description of the Army's training research program, conducted by the Army Research Institute (ARI) is provided in the Army Science and Technology Master Plan. A brief synopsis of these program follows.

Unit Training Strategies: This research program will provide an empirical basis for developing effective unit training strategies for armored and dismounted/light forces in both Active and Reserve Component units. New training methods will be developed and validated for critical combat functions (CCFs) as part of the effort to determine optimal mixes of existing TADSS, live fire, and field maneuver exercises. New methods for making informed training tradeoff decisions will also be provided. The research further develops improved performance assessment techniques for command, control, and maneuver, including the use of the PC based Unit Performance Assessment System (UPAS) which is being implemented in CCTT. In addition, the research will help develop and validate TRADOC's comprehensive CATS, and provide input to the Battalion Level Training Models being developed by ODCSOPS, to better specify OPTEMPO requirements.

Land Warfare Training: Research efforts in this program address cost effective training strategies for individuals and small units. This includes the development of simulation-based training, and performance assessment technologies, for future digitized companies/teams and in support of the Mounted Battle Space Battle Lab advanced warfighting demonstrations. Future research will focus on emerging Force XXI training requirements. Other research is underway to develop and demonstrate training concepts and technologies to improve the ability of light infantry units to fight at night and support the Dismounted Battle Space Battle Lab. A prototype computer-based language tutor is also being developed to teach job relevant Arabic and Spanish skills to Military Intelligence linguists. Other research employs state of the art virtual reality technology to develop individual training strategies and mission rehearsal techniques for commanders and members of high performance teams, e.g., Special Operations Forces. The virtual reality techniques will interface with DIS and will help maximize the value of systems procured by STRICOM.

Rotary Wing Training Strategies: The purpose of this research is to develop the most cost effective training strategies for critical Army aviator tasks. It will determine effective training tradeoffs among low fidelity trainers, full mission simulators, and flight training time. Training strategies will be developed and experimentally evaluated using the re-configurable Simulator Training Research Advanced Testbed for Aviation (STRATA). The results will be used to design optimum training strategies, and to establish the

requirements for simulator upgrades and/or the acquisition of new simulators. The training strategies will address the full range of critical aviation tasks, including individual, crew, and unit tasks.

Battle Command: This research is being conducted to improve the effectiveness of battle commanders and their staffs, with a focus on leader development, command staff design, and command staff training strategies. Innovative, simulation-based methods for career long leader development will be developed, e.g., to help ensure that some of today's lieutenants and captains develop the necessary knowledge and skills to become tomorrow's division commanders on the digitized battlefield. This research supports the requirements of the Battle Command Battle Lab.

Technology challenges: The Army is trained soldiers. As the Army charges into the 21st Century, one of our most challenging tasks is developing effective training strategies. The Army cannot afford to radically alter training resources in operational units to test various hypotheses about combat performance and capabilities under varying training resources and strategies. These units must maintain current combat readiness to meet real world deployments and training cannot be broken or injured simply to test a hypothesis.

However, the Army is changing how we change. The Army has under development some prudent test plans to balance the introduction of 21st Century simulation-based training with our current field training methods. Some training tasks require sweat and dirt equity to reap the payoff in combat. The Army must balance the "muddy boot factor." Our specific training research challenges include the following:

- What is the most effective and affordable mix of live exercises and training in synthetic environments?

- What is the effectiveness of DIS systems at each level of training - individual, unit collective, multiservice, and joint?

- What is good enough? What are the minimum levels of simulator fidelity (e.g., cost) required for effective training at the tactical level? What role should virtual environments have in mission rehearsal?

SECTION 5

TRAINING

The major objective of Army training, from a modernization viewpoint, is the effective and efficient integration of systems and nonsystems training technology and development within the three domains (live, virtual, and constructive) of simulation. While live training can never be replaced, the proper use of simulators and simulations within all three domains can enhance our current training program. Additionally, the application of technology will offset the restrictions imposed upon live training by high technology weapons systems, safety, environmental sensitivities, higher training costs. Embedded training is training provided by capabilities built into or added onto operational systems to enhance and maintain the skill proficiency necessary to operate and maintain that equipment. In meeting these objectives, training technology will better serve and support Army readiness in the 21st Century.

The Army seeks greater standardization in systems TADSS across all BOS. This ensures a consistent approach to training technology and equitable investment in TADSS for individual, collective, institutional, and unit training. In developing TADSS standards, the unique requirements inherent in each BOS will be recognized and supported. A major objective will be to develop and institutionalize embedded TADSS. Nonsystems TADSS will be developed to integrate system training devices, and to provide subsystems for training systems involving multiple devices.

The critical factors that force the Army to consider innovative application of training technology to achieve training readiness standards are: expanding capabilities of Army modernized weapons and battlefield systems which make traditional field training with these systems impractical; increased environmental sensitivities resulting in restrictions to conventional field training; increased costs of conducting conventional field training; increased safety awareness; and the requirement to synchronize all forces and BOS in noncombat environments from peacekeeping to multinational warfare. To mitigate these factors, the Army's approach to training technology must be integrated and focused.

SECTION 6

CONCLUSION

The NMS calls for a Total Army that is deployable, lethal, versatile, and capable of deterrence. The Army must have the ability to win wars decisively, swiftly, and with minimum casualties. Land Force Dominance is required to ensure quick, decisive victory. Only by maintaining a trained and ready total force can we meet the expectations that the American people have of America's Army. Training brings into balance those functions **we must do well.** Training is the imperative that bonds all other Army imperatives together in a coherent whole. Good training retains quality people; brings doctrine to life; melds new force structure into combat ready units; makes soldiers and units proficient on new equipment; and develops competent, confident leaders.

The Training Annex is a road map for future actions regarding training in the Total Army; its course is charted by CATS. CATS provides guidance on how the total force trains and the resources required for training. CATS describes the transition from a TADSS supported, high OPTEMPO/live fire training program to a TADSS-based training program using significantly lower levels of OPTEMPO/live fire. CATS calls for a mix of field training and simulators for individual training, and simulations for unit training at company level through echelons above corps. In accordance with CATS, units organize for training as they organize for combat. This strategy enhances combined arms and service support operations.

The TMA programs support a holistic approach to AT XXI. Each program contributes a critical piece to the Army's integrated training system and offers necessary linkages to combat readiness. Additionally, these programs together have a synergistic effect; each interacts with other training programs to provide an exponential benefit. All TMA programs must be sufficiently resourced to ensure the training readiness of the Army.

Bottom Line: The Army faces significant changes in the future. These changes will challenge our capability to train; we must train more effectively and efficiently. The maturing of current technologies and emergence of new concepts offer opportunities to improve the training of soldiers, leaders, and units. At the same time, constrained resources demand that we reshape the current training strategy to preserve the progress we have made, take advantage of new opportunities, and reduce the strains on both dollars and manpower. This Training Annex describes the anticipated future training environment, a training strategy for that environment, and provides the plan to carry out this strategy.

ANNEX S

SPACE

ANNEX S

SPACE

SECTION 1

INTRODUCTION

The Army in Space

Space is an integral component of the Army's technological and operational evolution. The Army's involvement in space and space related activities spans over 40 years. Space is essential to Army missions today. The Army's goal is to make the use of space a standard part of all Army planning and operations and an integral part of the execution of all missions. Army space activities include efforts to maintain the technological edge, to use research and development to gain more leverage from national investments in space systems, and to influence the design of future space systems. Today, soldiers deploy to all contingencies with equipment using space assets to enhance their ability to perform their mission swiftly with minimum casualties. This normalization of space provides the best utilization of technological capabilities to support warfighters, and is consistent with the principle of the Army's Enterprise Strategy to **Capitalize on Space-Based Assets.**

Army Space Policy

The Army's future is inextricably tied to space. Army Space Policy is derived from the National Military Strategy and the DoD Space Policy. Army Space Policy recognizes that space and space related capabilities are essential contributors to Army modernization and that Army access to national, allied, military, and commercial space capabilities and products is essential to successful operations. The policy directs the Army to:

- Conduct space and space related activities that enhance operational support and contribute to successful execution of Army or Joint Task Force (JTF) missions;

- Organize and train Army forces using space capabilities and products to make them more responsive, flexible, interoperable, survivable, and sustainable;

- Exploit existing space systems and ensure that new systems support land component requirements;

- Embed space applications in Army doctrine, training scenarios, wargames, exercises, and plans;

- Develop, maintain, and enhance Army space expertise;

- Develop space concepts, doctrine, requirements, and equipment; and

- Seek to normalize direct and immediate in theater response to commanders from evolving space-based capabilities.

The objective of this aggressive leveraging of space capabilities and products, normalized in concepts, doctrine, training, operations, and modernization, is to ensure that the Army maintains Land Force Dominance well into the 21st Century.

To accomplish this space vision, the Army has been developing concepts; identifying and documenting requirements; and training a cadre of space experts. Exploiting space requires an acquisition strategy that facilitates and integrates emerging space capabilities with existing and programmed capabilities. In addition, the Army must continue to capitalize on national and joint programs, as well as commercial, domestic, and international space systems. This must be done while supporting initiatives that satisfy not only common user requirements, but also satisfy Army unique requirements for space.

The management strategy for the Army's role in space is to develop a centralized focus, while maintaining decentralized execution. The United States Army Space and Strategic Defense Command (USASSDC) develops the centralized focus and is the proponent and integrator of space activities for the Army. SSDC provides direction to Army space activities, assists in the development of Army space related requirements, provides key research and development support to missile defense, is the focal point for the Army space research and development technology base, and ensures that national space assets contribute to Army requirements for intelligence preparation of the battlefield--particularly for Force Projection operations. Through these activities the USASSDC influences, integrates, and helps expedite the development and fielding of space capabilities and ensures Army warfighter access to space resources to enhance the accomplishment of Army missions.

The Army's Training and Doctrine Command (TRADOC) is publishing the Army doctrine for space (Field Manual 100-18, Space Support of Army Operations). The goal is to enhance awareness across the Army of the contributions of space applications to present and future battlefields and to ensure the Army voice is heard in establishing requirements for space products to support the warfighter.

Space Applications

Army Land Force Dominance in the information age cannot be achieved without the integration of space capabilities and products. As the Army continues to modernize, space systems offer increasing opportunities to meet Army Modernization Objectives. Support for operational missions is provided through exploitation of existing space assets and the application of space products to enhance warfighting capabilities. The Army does not have a separate "Space" mission area. Space functions and products are integrated into other mission areas and battlefield operating systems. This annex addresses Army space related activities that support the warfighter in the following functional application areas: communications; Position and Navigation (POS/NAV); Reconnaissance, Surveillance and Target Acquisition (RSTA), weather, terrain and environmental monitoring, and missile defense.

Communications. Global and theater-wide instantaneous communications using space assets and associated ground terminals provide flexibility, agility, and efficiency in all phases of operations. Space-based communications capabilities extend the range of theater terrestrial communications networks and allow interconnection of widely separated force enclaves. These capabilities are required to meet the demands of Army operations: on present day and future battlefields; for split-based operations; for increased operations tempo; for C2 on the move; and for a warfighter's net to provide unprecedented situational awareness. Space-based Military Satellite Communications (MILSATCOM) assets, augmented by civil SATCOM, enable these capabilities. The Army coordinates and manages the Ground Mobile Forces use of the Defense Satellite Communications System (DSCS) for the warfighting CINCs.

SPACE RELATED COMMUNICATIONS APPLICATIONS

- Provide Reliable C2.
- Improve Responsiveness and Flexibility of Tactical Forces.
- Provide Long Haul Communications.
- Access Fuzed Intelligence.
- Deny Enemy Access.

Figure S-1

SPACE RELATED POS/NAV APPLICATIONS

- Provide Three Dimensional Position, Location, and Navigation.
- Synchronized Operations through Precision Timing and Location.
- Determine Precise Enemy Location and Target Acquisition.

Figure S-2

Position and Navigation (POS/NAV). The use of small lightweight Global Positioning System (GPS) receivers provide confidence, speed, and flexibility in modern mobile warfare. Hand held and vehicle installed GPS receivers provide precise position location. GPS is used for route planning, fire support surveying, and navigation for weapon systems, helicopters, and ground vehicles. GPS enables rapid setup and automatic orientation of the SATCOM terminals that provide deployable satellite communications for the Force Projection Army.

GPS also provides timing for communication circuits, especially critical for high speed data communication. The integration of GPS with combat net radios also enhances situational awareness. The capability to contribute to the overall situational awareness, including combat identification, has added new dimensions to the warfighters horizon. GPS integration into smart weapons also enhances the Army's precision strike capabilities by increasing maneuverability of strike forces and by reducing engagement timelines.

SPACE RELATED RSTA APPLICATIONS

- Provide Global Surveillance
- Operate inside the Enemy Decision Cycle
- Enhance IPB Products
- Support Targeting for Precision Strike

Figure S-3

Reconnaissance, Surveillance and Target Acquisition (RSTA). The Army's Tactical Exploitation of National Capabilities (TENCAP) program focuses on tactical applications of national space systems. Originally designed to support strategic requirements, downlinking these systems to tactical levels provides current and accurate pictures of a threat (imagery, communications, and electronic signatures) during both planning and execution. Such national capabilities also support humanitarian efforts, as they did during Hurricane Andrew. Imagery data is used by multiple intelligence systems and, when combined with data from other assets, contributes to the Intelligence Preparation of the Battlefield (IPB). Secondary dissemination and

intelligence broadcast capabilities supported by space assets provide continuing situational awareness through all phases of operations. They provide the target acquisition ability to "see deep" in today's battlefield and then to assess the impact of "shooting deep."

Weather, Terrain, and Environmental Monitoring. Tactical Defense Meteorological Satellite Program (DMSP) downlinking provides accurate, secure, theater cloud imagery and profiles of some atmospheric elements to support tactical planning in real-time. Accurate meteorological data at target sites is required for long range acquisition and engagement. Surviving NBC attacks is increased by the knowledge of weather effects. Current Army weather and terrain satellite based information is obtained through commercial satellites and receivers. Air Force DMSP Small Tactical Terminals (STT) have not yet been fielded, and DoD does not have a terrain mapping (LANDSAT-type) satellite. Current map products are not available for many areas of the world where a Force Projection Army may be sent.

SPACE RELATED RSTA APPLICATIONS

- Plan, Rehearse and Execute Operations.
- Provide Accurate Meteorological Data.
- Operate with Full Knowledge of Weather Effects on Use of NBC.

Figure S-4

Space-based sensors, including commercial and national assets, can provide the most current Electro-Optical (EO), Infrared (IR), Synthetic Aperture Radar (SAR), and Multi-Spectral Images (MSI) of ground operations areas. When processed with elevation data, up to date broad area mapping products can be supplied by topographic engineer units. The integration of these products enhances terrain analysis and enable limited mission planning and rehearsal. New Remote Earth Sensing commercial license opportunities in this area will enable additional development and expansion of commercial sources for terrain imaging data.

SPACE RELATED MISSILE DEFENSE APPLICATIONS

- Provide Early Warning of Missile Attack.
- Cue TMD Systems to Missile Attack.
- Target Enemy Launch Systems.
- Provide Counterproliferation Surveillance.

Figure S-5

Missile Defense. Overhead coverage, such as the Defense Support Program (DSP) satellites, allows surveillance of enemy missile systems, cues active theater missile defenses, provides targeting information to attack operations forces through the Joint Tactical Ground Station (JTAGS), and allows all forces to take passive defense measures. The Army is also actively participating in requirements for the follow-on Space-Based Infrared (SBIR) system and the ground processing stations. In addition, the use of other elevated sensor platforms (JSTARS, AWACS, etc.) for missile defense roles is being thoroughly explored in advanced concept and technology demonstrations.

As proliferation of advanced missiles and missile technology continues, the missile defense application of space assets will become increasingly important. Theater Missile Defense, which counters those missiles both in flight and prior to launch, depend on data from space assets. Space assets are also important for the roles they may play in nonproliferation and counterproliferation surveillance and detection activities.

SECTION 2

WARFIGHTING CONCEPT

Space Supports Land Force Dominance and the National Military Strategy

The Army's use of space is important to the conduct of all phases of land warfare. The Army will continue to develop the use of space capabilities to support Army strategic roles and improve the execution of its missions across the entire spectrum of military operations. The modernization of Army space capabilities improves the capabilities of CINCs to achieve quick, decisive victory with minimum casualties and thus improves the Army's capability to execute missions which support the National Military Strategy.

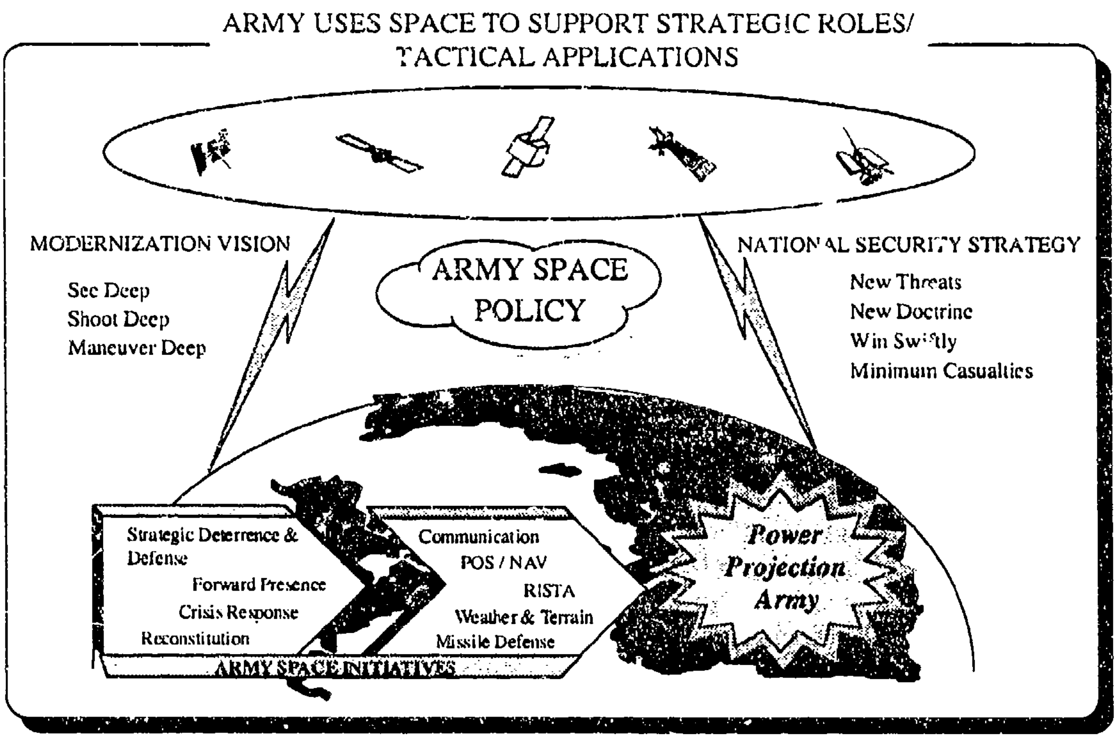


Figure S-6

Army Doctrine (FM 100-5, Operations, June 1993) recognizes the contributions of space applications to Force Projection. Space Support to Army Operations, (FM 100-18 (Draft), July 1994), describes the capabilities and employment of space systems that enhance the Army's execution of strategic, operational, and tactical missions across the range of military operations.

Force Projection and maneuver are enhanced by the use of mapping products for areas where no up to date maps exist and by the use of GPS for navigation over unfamiliar or featureless terrain.

Beyond line of sight extension of ground forces radio communication provides the information flow necessary for efficient command, control, and sustainment of split-based and highly mobile forces. This range extension and enhancement of targeting information are additional information requirements met by space capabilities. The sustainment of deployed forces also requires space capabilities for the development and transfer of databases, and to provide continuous in transit visibility of critical assets.

The delivery of timely space products to land forces was an essential ingredient of victory in Operation Desert Storm. The aggregate of national, civil, and commercial space systems is a combat multiplier which enhances the Army's ability to accomplish its roles and missions. From disaster relief, humanitarian, and security assistance roles to combat operations, decisive victory depends--to increasing degrees--on space capabilities and products.

These transitions in environment and doctrine create requirements that may best be met with space related applications for support of combat operations. Space related capabilities provide unique combat advantages, and direct access to those capabilities is the Army's umbilical to victory on the future battlefield.

Operations Other Than War (OOTW)

Space applications contribute to peacekeeping, humanitarian assistance, disaster relief; their use in Somalia, Rwanda and during Hurricanes Iniki and Andrew are but a few examples. In peacetime, peacekeeping, nation assistance, and security assistance are supported by communications, imagery, mapping, and meteorological data from space assets. In Somalia, the 10th Mountain Division faced vast stretches of poorly mapped, poorly navigable terrain. The void was partially filled by using mapping products developed from space-based systems, including TENCAP capabilities. These products were provided to the division from the Army Space Exploitation Demonstration Program shortly before deployment. The units were equipped with Small Lightweight GPS Receivers (SLGRs) updated to 15 meter accuracy and multi-spectral imagery converted hard copy products. Commercial International Maritime Satellite (INMARS) terminals were used to overcome the shortfall of immediately available intertheater communications in support of medical, administrative, and logistic needs. A new small tactical receiver for Defense Meteorological Satellite Program (DMSP) data and civil satellite data, was shipped to the division; it provided the Joint Task Force in Somalia timely, high resolution weather imagery.

Counterdrug Operations benefit from space-enabled capabilities of overhead surveillance in near real time, accurate position location to support intercepts, and instantaneous communications to operate inside the trafficker's decision loop.

The role of space exploitation and use of space products in operations other than war also set conditions for the Army's transition to crisis response.

Force Projection Operations

Predeployment. During the predeployment phase of Force Projection operations, space capabilities will be incorporated into training and preparation to enable Army forces to train the way they fight. Training and exercises are enhanced by bringing enemy and environmental conditions expected in theater to CONUS exercises/simulations. Collection and archiving of imagery support the rapid production of up-to-date maps for many areas of the world.

In the current environment responses to crises will normally be in concert with allies. Space capabilities are key to support these activities. Global communications allow proper coordination of international operations. Global communications also allow proper force tailoring for the anticipated mission and improved joint/combined training/exercises of forces. Alliance support activities include continuous surveillance and warning to decrease vulnerability.

The use of space by potential enemies to enhance their warfighting must also be addressed by the warfighter. Space denial against either space-based or ground-based systems may be necessary. The control of space is a key element to achieve and maintain a favorable air situation, a real time intelligence picture, and will become an increasing requirement for the warfighter to Win the Information War.

When a crisis requires Army participation, the Army notifies, mobilizes where necessary, prepares, and conducts training for those forces designated by the National Command Authority to meet the theater CINC's requirements. These forces rely on specific, predictive, and timely intelligence as the foundation for effective force generation and deployment preparations. Through space assets ground commanders can "see" the theater from the very first day of the crisis. Space assets enhance the intelligence preparation of the theater through near real time intelligence about the threat, the local situation, terrain, and weather conditions. Tactical forces will be able to gain In theater situational awareness during pre-deployment training. Commanders use this information to anticipate warfighting requirements and tailor combat forces and logistics packages to meet threats. Using LANDSAT and commercial earth sensor systems, Army engineer units can use topographical data to create new maps, and update old ones. These multi-spectral imagery and terrain data are also used to conduct mission planning and rehearsals. DMSP and commercially available satellite weather systems provide meteorological data from the theater of operations.

Early Entry. Forces are most vulnerable during the early entry phase of Force Projection, making force protection crucial. Space assets enhance force protection through missile defense, RSTA, and communications. TENCAP provides security by reducing the element of surprise and providing missile early warning. DSP satellites provide near real time intelligence and warning of ballistic missile launch. In theater, RSTA products are disseminated from ground processing facilities via the Area Common User Systems (ACUS) and UHF satellite links. Global communications are the backbone of split-based operations. The CONUS sustainment base is linked, from

deployment through the buildup of forces, with global satellite communications. Satellite communications are also critical to long range intertheater battle command. GPS allows constant tracking of critical assets during deployment and enhances the ability to deploy and maneuver once in theater.

Decisive Operations. During the operations phase of Force Projection, the commander moves against the threat to produce decisive results. Through space applications the commander enhances his ability to Dominate Maneuver Warfare, Win the Information War, Protect the Force, and Conduct Precision Strikes. The full spectrum of real time intelligence enhances warning, agility, and precision strike; consequently, the commander can maneuver against the threat's vulnerabilities. The use of satellite communications facilitates the commander's control of tactical maneuver at extended ranges and allows him to control the battle tempo. Space technologies are a critical component of battlefield digitization and are key to the command and control required to Win the Information War. Weather data from space enables exploitation of weather conditions to best advantage, while terrain imagery provides intelligence on poorly or uncharted terrain. As in other phases, DSP allows surveillance of enemy theater ballistic missile systems, alerts theater missile defenses, and warns forces to take passive defense measures.

Redeployment. Continuous intelligence update of potential threats during vulnerable redeployment protects forces from surprise. Continuous communications allow positive control and reorientation to any new crisis even during redeployment. Exact knowledge of unit equipment and location and status of supplies provide the ability to redirect forces on the move and facilitate recovery at home station, which enables a faster return to readiness for the next mission.

U.S. and allied operational success in Operation Desert Storm was directly linked to successful space exploitation. The aggregate of national, civil, and commercial space systems, aggressively exploited, during that operation provided a critical combat multiplier. The use of satellites for warning of ballistic missile launches, alerting of active defense missile batteries, and positioning location and communications extension to support maneuver added new dimensions to the Desert Storm battlefield. If this capability were not available in the future--through lack of funding, priority, or institutional commitment--the Army would lose much of its demonstrated flexibility, agility, capability to control operational tempo and to operate throughout the depth of battlefields. Continued development of space capabilities to meet battlefield requirements and the normalization of space use are imperative to achieve Land Force Dominance. Space exploitation assists smaller U.S. forces in maintaining a technological overmatch against potential enemies.

Space capabilities are so vital to the Force Projection Army that contingency operations teams are being formed at the Army Space Command to ensure Army access to space and provide space support directly to the warfighter. These five person teams provide space operations support to Army forces for both combat and

humanitarian contingency missions worldwide. These teams operate commercial and prototype space capabilities equipment or train personnel on-site to use the equipment.

In the future the Army must not simply exploit existing space assets. Rather, in the mid-term, we must prioritize and assert the land warfighter's space application requirements in order to take full advantage of space related capabilities that are currently being developed and fielded. In the far-term, we must assert Army influence in the design of tomorrow's spacecraft to assure that they meet warfighter requirements. In so doing, the Army will maximize the effect of space products and more fully achieve the force enhancement potential of space assets. The Army goal is to use space and space related capabilities and products to enhance the efficiency and effectiveness of land forces across the spectrum of military operations.

SECTION 3

CURRENT PROGRAM ASSESSMENT

Assessments of the capabilities needed to meet the operational requirements of Army space activity in the near-term (FY 95-96), mid-term (FY 97-00), and far-term (FY 01-09) are set forth here. Ratings of each capability or program are based on overall assessments of space related programs within an application area (without repeating the detailed assessment of the individual programs presented in other annexes). Our assessment (Figure S-7) projects to the far-term and is based on projected funding and uninterrupted development of several currently funded systems. Additional reductions in research and development funds and programs, or any failure to replace and/or modernize existing space assets, will reduce the rating for warfighting capabilities of our deployed forces. For some functions, commercial space systems may be available to supplement or support OOTW.

The current program assessments are as follows:

RED - No capability exists, or is insufficient to defeat the threat or provide the required support.

AMBER - A limited capability or quantity exists to perform the mission; and

GREEN - Adequate capability and quantity exists to perform the mission.

SPACE CAPABILITIES ASSESSMENT

	NEAR TERM (FY 95-96)	MID TERM (FY 97-00)	FAR TERM (FY 01-09)
COMMUNICATIONS	AMBER	AMBER	AMBER
POSITION/NAVIGATION	AMBER	GREEN	GREEN
RSTA	AMBER	AMBER	GREEN
WEATHER, TERRAIN AND ENVIRONMENTAL MONITORING	AMBER	GREEN	GREEN
MISSILE DEFENSE	AMBER	AMBER	GREEN

Figure S-7

COMMUNICATIONS

Satellite communications capability is critical to a Force Projection Army. The range extension capabilities of space are necessary to support Army requirements. These requirements are being driven by a global strategy and operations doctrine that envisions split-based operations and units widely dispersed on the battlefield.

Space Communications Programs

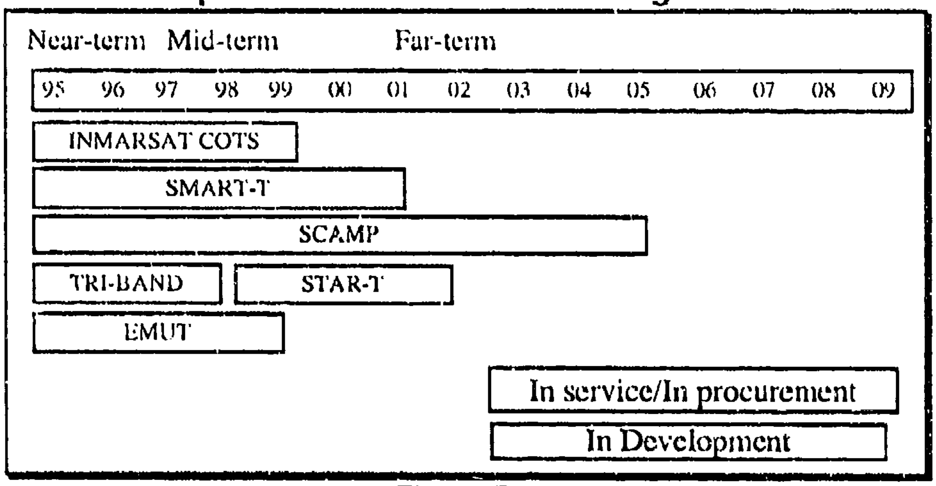


Figure S-8

The Army uses military and commercial communications satellites to carry large portions of intercontinental, intertheater, and intratheater traffic at brigade level and above. Some tactical intratheater users are also supported. During a crisis, however, the demand for satellite communications exceeds current capabilities. Access to channels in the satellite communications system will be improved by 1996 when Demand Assigned Multiple Access (DAMA) provides improved satellite channel access through the use of an automatic controller, which optimizes channel uses. Also, the Army, through DoD, is exploring increased use of commercial communications through the Commercial Satellite Communications Initiatives.

The Defense Satellite Communications System (DSCS) supports tactical communications through the Ground Mobile Forces Satellite Communications (GMFSC) program. The Army has about 200 GMFSC terminals that connect to other Army communication systems such as Mobile Subscriber Equipment (MSE) to provide connectivity between dispersed units. The Army is the lead Service for DSCS ground terminal RDA, operations, and sustainment.

Six prototype Tri-band (X, C, Ku) terminals that can directly access military and commercial transponders are now being fielded. These will be modified, based on user experience, and fielded as SHF Tri-band Advanced Range-extension Terminals

(STAR-T) beginning in 1998. Coupled with initiatives to lease/purchase commercial satellite capability, STAR-T will greatly enhance warfighter access to multi-channel SHF SATCOM. STAR-T will replace GMFSC and Trojan Spirit terminals. The prime mover for these terminals will be a single HMMWV.

Initial entry operations are constrained by availability of sealift and airlift capabilities. Communications assets must be packaged efficiently to provide the greatest capability in the smallest package. In the near-term, easily deployable Enhanced Manpack UHF Terminals (EMUT) and INMARSAT commercial off-the-shelf terminals will contribute to enhancing the warfighters' early entry capabilities through the use of space. They will provide a readily deployable split-forces communication capability down to brigade level for every division and corps, the communication links for C2-on-the-move and the Warfighter net, giving commanders a SINCGARS combat net radio/SATCOM interface.

As mid-term technical and tactical capabilities of the threat continue to improve, C4I systems will need to provide more interoperability for joint and combined missile defense and joint precision strike requirements and provide for rapid, seamless distribution of large volumes of processed data critical to Win the Information War.

These improvements will maintain communications **AMBER** in the mid-term. Increasing requirements will mean communications remain **AMBER** through the far-term. Far-term improvements will focus on improving C2 for mobile operations (MILSATCOM on the move), and the addition of reliable secure communications in all battlefield conditions. MILSTAR (SMART-T and SCAMP terminals), the next generation of military communications satellites, will provide highly survivable, jam resistant, worldwide, secure, joint service communications to strategic and joint task force warfighters. In the near-term, the Army MILSTAR program is focused on corps, division, and Special Operations Forces communications.

POSITION AND NAVIGATION (POS/NAV) PROGRAMS

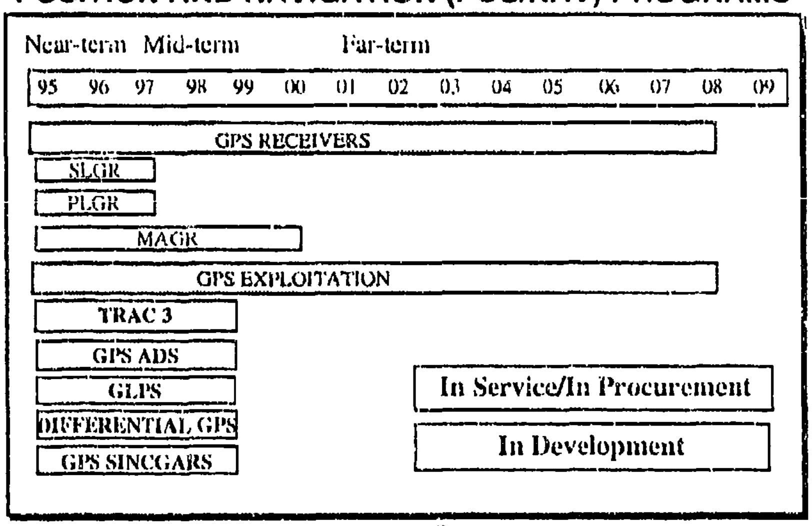


Figure S-9

The GPS constellation of NAVSTAR satellites is increasingly important to Army operations. Use of Small Lightweight GPS Receivers (SLGR) provided confidence, speed, and flexibility in Desert Storm. GPS information is programmed to be incorporated into combat net radio communications and embedded in a wide variety of Army systems. The availability of this information and the ability to distribute it on the battlefield will aid in achieving better situational awareness and fratricide avoidance. Mid-term capabilities for POS/NAV are **GREEN**. Precision Lightweight GPS Receiver (PLGR) production funds will provide for fielding by FY 97. Army Aviation will achieve the Miniature Airborne GPS Receiver (MAGR) requirements of the Federal Radio Navigation Plan by the year 2000. The resulting capabilities will mean a **GREEN** posture for this application through the far-term.

RECONNAISSANCE, SURVEILLANCE, AND TARGET ACQUISITION (RSTA)

Army deep precision strike operations are limited by target acquisition and sensor capabilities; therefore, overall near-term RSTA is **AMBER**. The priorities for resolution during the mid-term focus on improving the tactical commander's ability to "see" his area of interest and on his capability to target the threats.

RSTA Programs

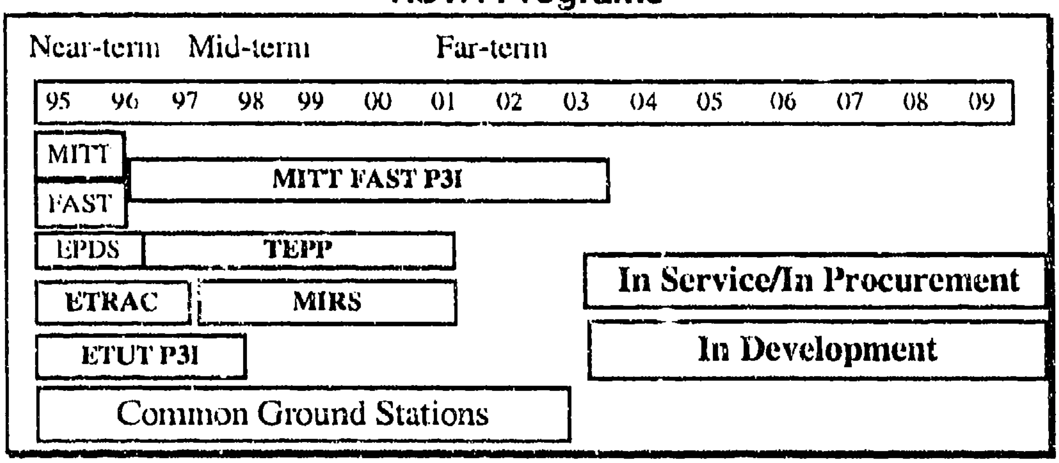


Figure S-10

The mid-term force has improved space systems with enhanced capabilities against modern signal environments and with improvements in satellite imagery, down-linking, and communications; but target acquisition remains **AMBER**. In the far-term, U.S. Army space capabilities will further enable Joint Precision Strike by providing real time space data downlinks to the tactical level along with the improved processing and dissemination capability. Providing an accurate threat picture (imagery, communications, and electronic signatures), during both planning and execution, will bring the far-term assessment to **GREEN**.

Space will also be key to future ability to monitor the critical areas of Weapons of Mass Destruction (WMD) proliferation and treaty compliance. The availability of this information will allow better preparation of Army forces for potential contingencies.

WEATHER, TERRAIN AND ENVIRONMENTAL MONITORING

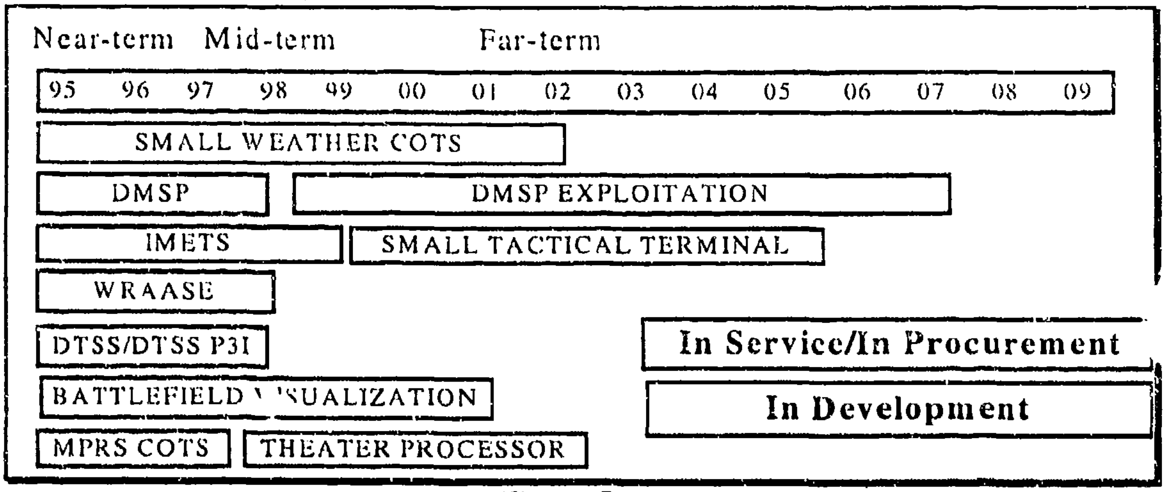


Figure S-11

The Army is critically dependent on weather information to plan and conduct operations. The Defense Meteorological Satellite Program (DMSP) provides down-linking for accurate, near real time theater level weather and meteorological data at target sites for long range engagements. Currently, commercial receivers provide data/imagery from civil and allied weather satellites. The fielding of small commercially weather terminals provides improved capabilities to units. The addition of small tactical antennae will complement the DMSP Small Tactical Terminal System (developed by the Air Force) and make it more applicable to the Army's missions by providing an encrypted, assured source of weather data. These developments mean this area is **GREEN** in the mid-term.

Although space-based imagery has proliferated in the last several years, the availability of imagery in the near-term is limited by the number of areas that have been mapped to date or that have topographic data available to transfer the images into mapping products. With the availability of LANDSAT and SPOT imagery, large area low resolution (10-meter) data is available.

Data from LANDSAT and SPOT satellites are fused to provide broad area mapping products to support contingency operations, especially areas where maps either do not exist or are too old to be useful. However, LANDSAT 4 and 5 are nearin the end of their useful lives, and LANDSAT 6 failed to achieve orbit due to a launch mishap. Additional satellite ground processing capabilities will allow LANDSAT and SPOT data to be used in a full Mission Planning and Rehearsal system, a tool that will significantly enhance planning and training. However, imagery through the mid-term is impacted by the loss of LANDSAT 6.

Long-term, Army requirements call for a High Resolution Multi-Spectral Sensor Imagery (HRMSI) capability on LANDSAT type satellites. This would reduce the need for a topographic database to produce mapping products. Continued support for the broad area coverage capability is necessary. Without our own capability, Army operations would be inhibited, and DoD would be dependent on foreign sources for unclassified imagery. Continued increases in the demand for imagery will also require dissemination systems. The distribution portion of the topographic engineering capability is not programmed to keep up with increased demand in the far-term.

Improvements desired in the far-term provide tailored weather and environmental/ topographical products for tactical units. These augment intelligence preparation of the battlefield and aid decision making. Integration of weather receivers into appropriate Army systems will provide a capability to merge DMSP data with terrain information, enhancing battle planning and execution. This integration means our overall capabilities in this area remain **GREEN** into the far-term.

MISSILE DEFENSE

Army space capabilities to warn the force are a cost effective survivability enhancement to protect the force. Space-based warning enhances all four pillars of the Army's Theater Missile Defense (TMD) capabilities. Overhead coverage allows surveillance of enemy missile systems, cues active theater missile defenses and attack operations forces, and allows forces to take passive defense measures. Shortfalls in capabilities and the proliferation of threat theater missiles today result in an **AMBER** rating. Required improvements will allow us to better warn threatened units and populations, engage at greater ranges, and give us the opportunity to engage enemy launchers more effectively by providing shooters more precise launch point locations.

Missile Defense Programs

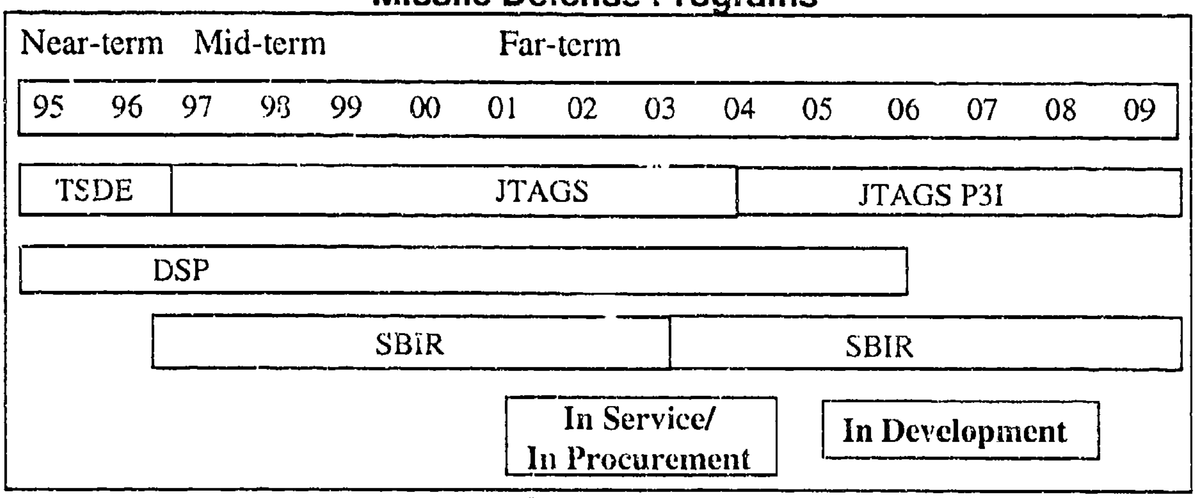


Figure S-12

Protection of the force is enhanced in the mid-term through the use of Defense Support Program (DSP) data processed by Joint Tactical Ground Station (JTAGS). JTAGS is a transportable system which provides In theater stereo processing of DSP data. However, this capability, combined with additional fielding of communications capabilities in the far-term, creates a **GREEN** far-term assessment.

With the termination of the next generation early warning systems (i.e., Follow-on Early Warning System), the Army must aggressively participate in defining requirements for the follow-on Space-Based Infrared (SBIR) system. The capability of this replacement system to satisfy Army theater warning requirements will impact the far-term rating of this area.

Force protection is enhanced most in the mid-term by the initial fielding of the Theater High Altitude Air Defense (THAAD) system. THAAD provides wide area coverage and protection from longer-range ballistic missiles. Through the mid-term and into the far-term, THAAD operates in conjunction with the lower tier Patriot to provide multi-layer defense of critical theater assets. In the far-term when the very deployable, highly mobile Corps SAM is fielded, the missile defense for maneuver forces is sufficient for forward area defense.

SECTION 4

RESEARCH DEVELOPMENT AND ACQUISITION STRATEGY

Science and Technology Programs

The Army's overall strategy for near-, mid-, and far-term exploitation of space is consistent with current fiscal constraints and DoD acquisition strategy. In the near-term, the goal is to leverage the capabilities of existing satellites and space assets. Acquisition implications for this period mean the Army will procure receivers to accept data and information from existing networks and capabilities.

For the mid-term, the Army is leveraging systems currently in advanced development. Input to final development allows the Army to better exploit the capabilities of new systems. This translates to the procurement of processors to take advantage of capabilities available through mid-term space assets.

For the far-term, the Army is focusing space related research and development to provide tailored products to meet specific land force requirements for the 21st Century. The Army must influence satellite design and operation so that the Army has direct access to the required information and capabilities.

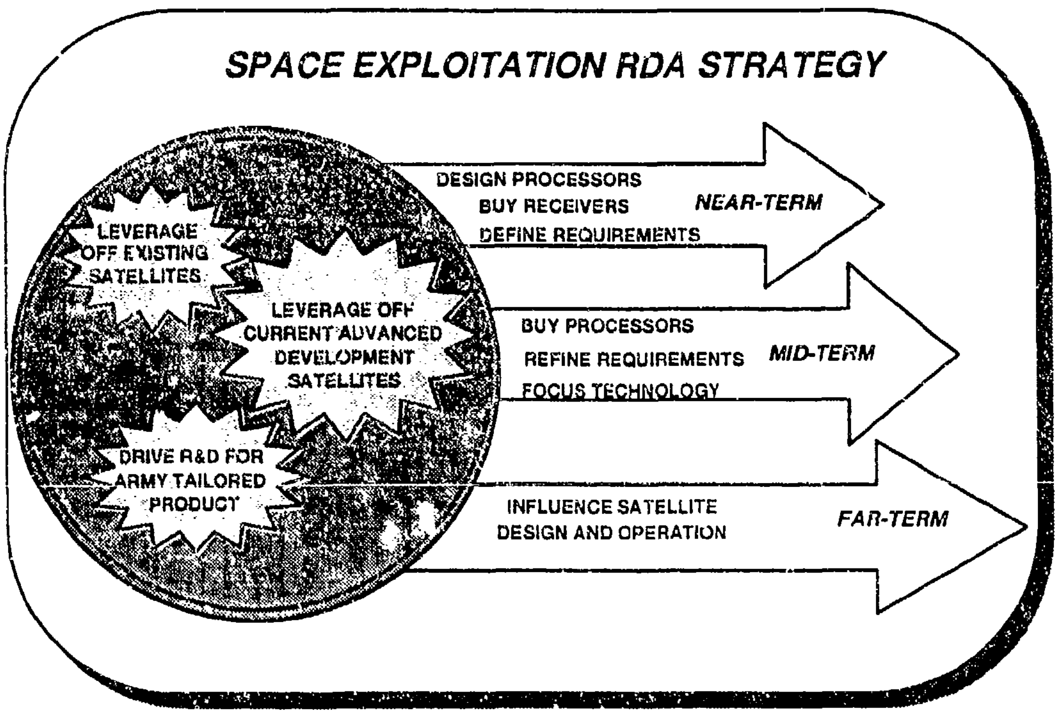


Figure S-13

Defense wide Science and Technology efforts seek exploitable gains in technology areas to achieve certain joint military capabilities. Many of the required joint military capabilities sought by this technology focus are space related.

The Army's focus for technology development in modernizing its space assets is to exploit space for the tactical commander (see the Army Science and Technology Master Plan (ASTMP)). Therefore, the Army's space related research looks to provide several capabilities to the warfighter:

- A reliable, secure, space-based communications network to operate through adverse weather and threat conditions;
- Satellite communications-on-the-move;
- Interconnection of split-based operations at medium and high data rates;
- Enabling the Army C3I systems to cycle faster than those of potential adversaries;
- Accurate navigation across featureless terrain in all weather;
- Obtaining target signatures of interest during day/night operations and through weather and concealment;
- Accurately measuring and predicting environmental conditions over areas of interest;
- Identification of Friend, Foe, and Neutral forces;
- Providing Theater Missile Attack warning and cueing to friendly forces and allies;
- Providing real time, survey quality pointing accuracy for directional systems to include weapon systems; and
- Providing the soldier with the advantage in Winning the Information War through the use of space.

The Army has been developing meaningful Science and Technology Objectives (STOs) and Advanced Technology Demonstrations (ATDs) to demonstrate and develop these capabilities. They support space applications for exploratory and advanced technology development. Approved STOs and ATDs are incorporated in the ASTMP updates and integrated into the Army Modernization Plan.

This technological development process provides added value to the current Army Acquisition Strategy for space related materiel developments. The acquisition strategy already includes using Nondevelopmental Items (NDI), Commercial Off-The-Shelf equipment (COTS), and commercial, civil, and tactically-oriented satellites to improve warfighting capabilities.

Force Modernization Programs

Army doctrine and operations have become increasingly dependent upon space capabilities. Ground force tactical operations provide several opportunities to apply space capabilities. Modernization programs that realize the benefits of space related capabilities and products are distributed across the space application areas. Without space related capabilities and products, the Army would be unable to fulfill its ever-expanding missions.

Communications. During crisis the demand for satellite communication exceeds current capabilities. Increased access to channels in the satellite communications system is required. Military SATCOM systems are currently supplemented by commercial INMARSAT and INTELSAT networks. By 1996, Demand Assigned Multiple Access (DAMA) technology will offer improved satellite channel access through the use of an automatic controller which optimizes channel utilization.

The Army MILSTAR program is focused on corps, division, and Special Operations Forces. Later, MILSTAR II satellites will have increased data rate capabilities. After the turn of the century, MILSTAR III satellites will also take advantage of the currently developing Small Satellite Technology. The SCAMP and SMART-T terminals are being developed to implement the Super High Frequency (SHF) and Extremely High Frequency (EHF) capability of MILSTAR.

The Command, Control, and Communications and Computers modernization annex (Annex E) provides additional information on communications applications of space.

Position and Navigation (POS/NAV). The Army is currently fielding the Precision Location GPS Receiver (PLGR) with an error of less than 15 meters. Continued proliferation and use of these GPS devices will enhance the Army's overall combat, combat support, and combat service support capabilities in the mid-term. The Army provides support for GPS receiver development and the Joint Program Office.

Current Combat Identification initiatives to reduce fratricide depend on GPS data to provide friendly locations. GPS information is programmed to be incorporated into combat net radio communications, and an embedded capability will eventually be in all vehicles/individual equipment. The availability of this information, coupled with the capability to distribute it on the battlefield, will improve situational awareness and aid fratricide avoidance.

GPS and SATCOM provide logisticians an asset tracking capability (TRAC-3). This will make sustainment operations much more efficient by maintaining in transit visibility of key resupply items and enabling redirection of assets when situations change. Navigation assistance with GPS also assists planning of resupply transit routes and rendezvous points. A developmental model of the Total Distribution Advanced Technology Demonstration system has already shown its potential. It has tracked supplies aboard aircraft and ships and redirected materiel to forces on the move. An Asset Management module for this system links strategic, operational and tactical data with a Combat Service Support Control System. This enables commanders to know the overall status of reinforcing units and the location of critical items in the supply pipeline.

Additional GPS Exploitation programs will provide tactical commanders rapid and accurate survey support, precise position (Differential GPS), and azimuth determination (ADS) using GPS and Advanced Communications Technology Satellites (ACTS). Precise GPS position and pointing devices may replace gyros and north seeking modules in weapons systems including AFAS, Patriot, and Firefinder.

Reconnaissance, Surveillance and Target Acquisition (RSTA). The Army TENCAP program is currently fielding the Mobile Integrated Tactical Terminal (MITT) and the Forward Area Secondary Imaging Dissemination and Tactical Related Applications Terminal (FAST) to Divisions and select brigades. These systems provide secondary imagery and SIGINT receive capabilities. They also enable limited analysis of national and theater intelligence data.

Evolutionary development will continue with the modernization of the Enhanced Tactical User Terminal (ETUT) and Electronic Processing and Dissemination (EPDS) at Corps. Two Enhanced Tactical Radar Correlators (ETRAC) will be fielded to corps in FY 95 and FY 97. A new Miniature Imagery Receive System (MIRS) will be fielded to corps in FY 00 to replace the Imagery Exploitation System (IES). EPDS will be replaced by the Tactical Electronic Processor (TEP) in FY 01.

All TENCAP systems are interoperable and directly interface with other Army communications and tactical display processors. The incorporation of more robust multi-wave flexible communications will expand these interoperable capabilities. Further improvements include downsizing of TENCAP systems to enhance rapid deployment and the provision of graphic display software for rapid situational assessment of the battlefield. TENCAP imagery includes EO, IR, and SAR systems.

Space exploitation RSTA efforts also include programs that are developing:

- Graphic situation displays that integrate information derived from imagery assessments and SIGINT, and then overlay this information on a map background to provide a "picture" of the battlefield;

- Workstations that exploit multi-spectral imagery and add a new dimension to mapping, targeting, and situational assessment for the commander;

- Multi-source digital mapping and display capabilities, including all weather day/night sensors, camouflage and foliage penetrating sensors, and the potential capability for detection of minefields and NBC weapons;

- Integrated target detection and sensor to shooter data transmission capabilities; and

- Rapid automated analytical capabilities using on board processors and software, plus advanced processors, to handle greater volumes of data and shorten decision cycles.

In the far-term, U.S. Army space capabilities will further enable Joint Precision Strike by providing real time space data downlinks to the tactical level, plus improved processing and dissemination capability, which enables the data to be fused with information obtained from other RSTA sources.

Additional information about the use of space in the context of these mission areas is in the Intelligence and Electronic Warfare (Annex G) and Fire Support (Annex H).

Weather and Terrain. Currently, commercial receivers provide data/imagery from civil and allied weather satellites for Army requirements. Meeting the objective of tailored real time weather and environmental/topographical products for tactical units requires: improved processing capabilities; the development of Army unique sensor suites; communications standards for space platforms; advanced ground stations/receivers capable of receiving, processing, fusing, and interpreting weather and environmental data; and better means of dissemination. Some improved capability can be achieved in the interim by fielding COTS laptop-based weather terminals to early deploying contingency forces until forces with robust Integrated Meteorological System (IMETS) arrive. These systems may be deployed with the highest echelon. They will use dial-up capabilities to access central weather facilities for theater level information. The communication connectivity will be via SATCOM.

Defense Meteorological Satellite Program (DMSP) downlinking can provide accurate theater weather in real time and accurate meteorological data at target sites for long range engagements. The IMETS, which began low rate initial production in FY 94, will eventually include a DMSP receiver and processor. IMETS will initially use WRAASE, the commercial weather receiver, to receive nonencrypted weather imagery and data from U.S. civil and foreign satellites, both of which could be turned off in crises and conflicts. A Pre-Planned Product Improvement (P3I), beginning in 1996 will also field the Small Tactical Terminal to receive direct downlink data from DMSP. The IMETS DMSP receiver and processor will provide an encrypted, U.S. owned, assured source of weather data and imagery. This program is part of a Commercial Space

Package capability that has been identified and refined, and is being fielded through the Army Space Exploitation Demonstration Program and the Louisiana Maneuvers process.

The far-term requirements will be satisfied by the integration of weather receivers into appropriate Army systems. Far-term improvements provide tailored weather and environmental/ topographical products for tactical units to augment intelligence preparation of the battlefield and aid decision making. They include the capability to merge DMSP data with terrain information to produce integrated environmental effects, and models/simulations and virtual reality displays, that will enhance battle planning and execution.

Although there has been a proliferation of space-based imagery in the last several years, the availability of imagery to the warfighter is limited by the number of areas mapped to date or from which topographic data is available for the production of mapping products. The availability of LANDSAT and SPOT imagery provides large area low resolution (10 meter) data. Data from LANDSAT and SPOT satellites is fused to provide broad area mapping products to support contingency operations in areas where maps either do not exist or are outdated. Additional satellite ground processing capabilities will allow use of LANDSAT and SPOT in a full Mission Planning and Rehearsal system and will significantly enhance planning and training.

In the area of mapping, charting and geodesy, the Digital Topographic Support System (DTSS) is already in low rate initial production. Its introduction will greatly improve our mapping support to tactical units and provide a capability to deal with short notice, unanticipated requirements. A upgrade to DTSS is currently under consideration that will allow processing of multi-spectral imagery and production of hard copy MSI (Digital Cartographic Capability). A LANDSAT type satellite with High Resolution MSI (HRMSI) would further enhance mapping support. The Battlefield Visualization program will demonstrate the technologies needed by tactical commanders to integrate various image products with digital terrain and MSI data and simulate the appearance of the terrain along a planned course with the Mission Planning Rehearsal System (MPRS). With this system terrain reconnaissance and other tactical missions can be planned and rehearsed. Near real time threat data may also be portrayed with a 3-D perspective view.

Missile Defense. The Army's ability to warn forces of impending tactical ballistic missile launch depends on space-based early warning, such as Defense Support Program (DSP) data. This warning then initiates passive force protection actions, active antimissile defenses, and counterattack operations against missile launchers. Fielding the Joint Tactical Ground Station (JTAGS) will provide direct DSP downlink mobile ground stations for a theater commander who can then process and disseminate near real time warning of theater ballistic missile launches. JTAGS is a transportable system which will simultaneously process data from up to three DSP satellites It will provide timely and accurate launch point location for attack operations, impact area prediction for local passive defense warnings, and in-flight position

information for cueing active defenses. JTAGS warfighting utility will be enhanced because it connects directly into the BM/C3I infrastructure and receives, processes, and disseminates missile launch information in theater. The prototype Tactical Surveillance Demonstration Enhancement (TSDE) terminal is currently available for contingencies and is used for Joint Precision Strike advanced technology demonstrations. This capability, combined with additional fielding of communications capabilities, will help offset sensor shortfalls.

Sensor shortfalls are primarily related to the short-range ballistic missile threat and the increasing threat from hard to see cruise missiles--UAVs, and RPVs. Development and evaluation of follow-on systems to DSP are important for force protection and precision strike against these critical mobile targets. With the termination of the next generation early warning systems (i.e. Follow-on Early Warning System), the Army must aggressively participate in defining requirements for the follow-on Space-Based Infrared system (SBIR). The ability of this replacement system to satisfy Army theater warning requirements will impact theater missile capabilities. The ALERT Army ground processor terminal for SBIR will be a Pre-Planned Product Improvement (P3I) for JTAGS. It will also provide Talon Shield integration.

The USASSDC conducts several technology programs related to missile defense. These address such areas as sensors, battle management, kinetic energy, directed energy, and survivability technologies in support of Army PEO Missile Defense elements.

Space exploitation is also key to our future capability to monitor the critical areas of Weapons of Mass Destruction (WMD) proliferation and treaty compliance. Sensor improvements are being pursued to monitor and counter the proliferation of WMD and missile technology. New satellites are being developed to detect nuclear weapons production facilities and electromagnetic pulses produced by nuclear tests. New Multi-spectral Thermal Imaging (MTI) satellites will test ways to use future LANDSAT-type satellites by using imagery in various bandwidths to monitor weapons proliferation. Improved optical, signal, and radar intelligence satellites are also being tested to better track and counter proliferation.

In addition to its support of development programs across the space application mission areas, USASSDC provides key research and development support via its management of the Army Space Applications Technology Program (SATP) and its implementation of the Army Space Exploitation Demonstration Program (ASEDP).

Space Applications Technology Program (SATP)

The former Army Space Technology and Research Office (ASTRO) has been integrated into USASSDC and renamed the Space Applications Technology Program (SATP). This organization coordinates and develops key technologies from the science and technology base, through Science and Technology Objectives and Advanced Technology Demonstrations, for the application of space capabilities. These

technologies are then handed off to materiel developers/program offices or used in the Army Space Exploitation Demonstration Program.

Army Space Exploitation Demonstrations

The Army Space Exploitation Demonstration Program (ASEDP) increases the Army's awareness and exploitation of space capabilities, and demonstrates value-added aspects of the Army's Space Modernization programs. The ASEDP demonstrates new technologies for possible further development, educates tactical commanders on the use of space assets to enhance Army operations, and assists in defining/refining requirements for further documentation. Demonstrations are technical, conceptual, or operational demonstrations.

Technical demonstrations show the Army the technical feasibility of potential capabilities and serve to determine support, or the lack thereof, for future development.

Conceptual demonstrations are intended to stimulate doctrinal consideration of capabilities when solutions are sought for particular Army requirements and deficiencies.

Operational demonstrations are conducted with prototype or Non-Developmental Items (NDI) to see if a capability actually helps units accomplish their missions. If a demonstrated capability is determined useful, appropriate transition partners are selected to ensure the capability becomes an Army development or acquisition initiative. Largely as a result of these operational demonstrations, Contingency Operations teams are now being formed to deploy on contingency missions to operate space capability equipment or train on-site personnel.

The demonstration program shows the value of space capabilities to the field Army. The program supports continued technology developments, and where appropriate, supports subsequent materiel developments. Global Positioning System (GPS) programs have been successful products of the ASEDP. A Nondevelopmental Gun Laying Positioning System (GLPS), which enables laying of non-Paladin Howitzers, mortars, direction finding systems, and alignment of missile systems has been demonstrated and is now funded in the POM.

Other Development Program Sources

Development of a credible and robust space exploitation capability requires the pursuit of potential opportunities from various sources. An essential thrust of the Army Science and Technology strategy is to leverage non-Army programs. The Army gains substantial leverage from the National Laboratories of the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA).

Outside the U.S. sharing and leveraging RDT&E resources with NATO and major non-NATO allies also offer potentials that could increase interoperability combat multipliers.

Investment Strategy

The Army's increasing dependency on space warrants expanded efforts to exploit space capabilities. The research, development, and acquisition programs exist because the Army recognizes the opportunities to apply space related capabilities to ground force tactical operations. In many cases the Army has leveraged investments made by other services and organizations. Land force unique applications of space systems --such as tactical mapping and land navigation--need to be aggressively pursued by the Army because these applications are not likely to be addressed by other users.

The Army must continue to protect its warfighting capabilities by aggressively pursuing its legitimate role in the development and implementation of a DoD wide space policy. The Army must develop an investment strategy for space consistent with the value of space capabilities to warfighting. The aggressive exploitation of space is needed to continue Land Force Dominance through technological overmatch and Win the Information War.

SECTION 5

TRAINING

Doctrine

The Army's roles and missions in space must be, and are being, defined in joint, combined, and Army doctrine. Joint doctrine is being developed; Joint Publication 3-14, Space Operations will build on the principles set down in Joint Publication 3-0, Joint Operations. The Army's capstone doctrine, Field Manual 100-5, Operations, now reflects the Army's use of space in such functions as Force Enhancement, Force Application, Space Control, and Space Support.

Additionally, Space Support to Army Operations, Field Manual (FM), 100-18 (Draft), enumerates current space system capabilities and provides guidelines for the application of space capabilities to support Army operations. This doctrinal publication also discusses leader development, training, and space related modernization initiatives.

The use of space enhances the Army's capability to apply the basic tenets of its developing doctrine. The vital role of the Army's use of space can be seen by assessing the contributions of space related capabilities in terms of the information age. Information Operations are becoming more and more critical to Army training, and space systems are the basis of the Army's information systems.

Training Strategy

The integration of space systems and space products in Army operations is a continuing process. Major doctrinal and procedural changes will occur as the result of digitizing the battlefield and integrating space capabilities. Increasing involvement in space activities requires continued development and expansion of space training and education programs.

General space awareness training and education must be integrated in the education and training programs for all members of the Army team. Army commanders and staff will require knowledge of the space systems and capabilities available to support military operations. Equally, they must know how to exploit space systems and products. The Army's Combat Training Centers (CTCs), Pre-Command Courses (PCC), and the Battle Command Training Program (BCTP) must continue to insert space-based capabilities into their exercises and place increased emphasis on the integration and execution of these elements. The development of a corps of space smart personnel is critica to the Army's continued use of space and exploitation of space products.

As the Army fields more capabilities that use space assets and achieves greater flexibility in meeting warfighter requirements, the access to these assets will require more efficient planning and management. Technical knowledge of networks and satellite applications will be required by both providing and using units. Management of these networks will become critical as user requirements increase and more space assets are fielded to meet those requirements. This will be particularly true for short notice contingency operations to areas where previously deployed capabilities or host nation infrastructure do not exist. An effective organization and trained personnel must be available to provide the warfighter access to space products. The warfighters must also be trained to efficiently use these capabilities to win swiftly with minimum casualties.

Simulations

As the complexity of warfare increases, realism in training and leader development must also increase. The use of existing Training Aids, Devices, Simulators, and Simulations (TADDS), and the development of new, similar materials will enhance the tactical and technical competence of all soldiers. The use of simulations is particularly necessary due to the scope and high cost of space activities.

The Army must continue to aggressively pursue the incorporation of space-based capabilities and ground based space related activities in joint and combined exercises and simulations. Significant benefits to the Army are providing opportunities to learn more about other service elements which have roles in space operations and to teach others the roles that the Army plays in joint and multinational operations, while exploiting space-based capabilities. Such two-way training experiences can also occur by assigning Army personnel to key space related departmental, joint, and national programs.

Summary

The Army must continue to develop the experience and expertise necessary to focus the space technology base and link it directly to fulfilling the needs of the warfighter. The Army's investment strategy for Space must include space education and training.

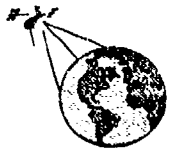
SECTION 6

CONCLUSION

Space related capabilities provide unique combat advantages to the warfighter. A proven synergy exists on the battlefield due to the aggregate of available space capabilities. The Army has become dependent on capabilities provided by and via space assets. Critical to achieving victory are the following advantages: long haul, high capacity communications, precision navigation, deep surveillance, target acquisition, timely mapping, real time weather, and missile launch warning. The aggregate of national, civil, and commercial space systems provide the Army with the means to retain initiative, agility, depth, synchronization, and versatility. These are critical capabilities that must be aggressively exploited. Required access to these assets will grow as increased capability is provided. Assured access will grow in importance to the warfighter for future success. Assured direct access to these capabilities is the Army's umbilical to victory on the future battlefield.

The Army has taken recent steps to achieve this assurance. In August 1992 the Army consolidated the Strategic Defense Command and the Army Space Command into the Space and Strategic Defense Command. Along with this consolidation went the designation of the Commanding General of USASSDC as "the focal point for the exploitation of space and strategic matters and responsibility for the exploitation of space and strategic assets for use by the warfighting CINCs." Since that time the Army Space and Technology Research Office (ASTRO) and the Army Space Program Office (ASPO) have also been incorporated into USASSDC. This consolidation of Army space assets within one organization permits the centralization and integration of Army space efforts under a single commander, who can serve as the focal point and can speak with authority for the Army concerning space matters. At the same time, execution of space activities will be decentralized to achieve the integration required into each of the Army's battlefield operating systems.

The ultimate goal for Army space exploitation is to institutionalize space capabilities throughout the spectrum of Army operations. Space must be as normal for soldiers as a tank, a helicopter, or an M-16 rifle. Space systems are costly. The needs of the force must be balanced with fiscal reality and declining force structures, but the value added by space capabilities provides the rationale for continued and aggressive exploitation of space.



THE ARMY NEEDS SPACE FOR:

- Today's operations - Space enables Army operations through increased situational awareness particularly in areas with little or no infrastructure

- Tomorrow's operations - Power Projection Army depends on assured access to space

- Army space products must continue to be developed, acquired, fielded, and operated by our Space organizations who understand how the Army fights now and in the future

Bottom Line: Our space products provide, at low cost, high leverage capabilities that provide a force multiplier for Combat Operations today and in the future

ANNEX T

SPECIAL OPERATIONS

ANNEX T

SPECIAL OPERATIONS

SECTION 1

INTRODUCTION

A U.S. military, called upon to undertake expanded non-traditional military missions, is likely to increase emphasis on Special Operations (SO) and to generate increased deployments of Special Operations Forces (SOF). Army Special Operations Forces (ARSOF) possess unique capabilities.

Special Operations (SO) are activities conducted by specially organized, trained, and equipped military and paramilitary forces to achieve military, political, economic, or psychological objectives. According to Public Law (10 USC 167), SO include direct actions, strategic reconnaissance, unconventional warfare, foreign internal defense, civil affairs, psychological operations, counterterrorism, humanitarian assistance, theater search and rescue (in the context of SO), and such other activities as specified by the National Command Authorities. Special Operations Forces (SOF) are those forces specifically organized, trained, and equipped to conduct SO.

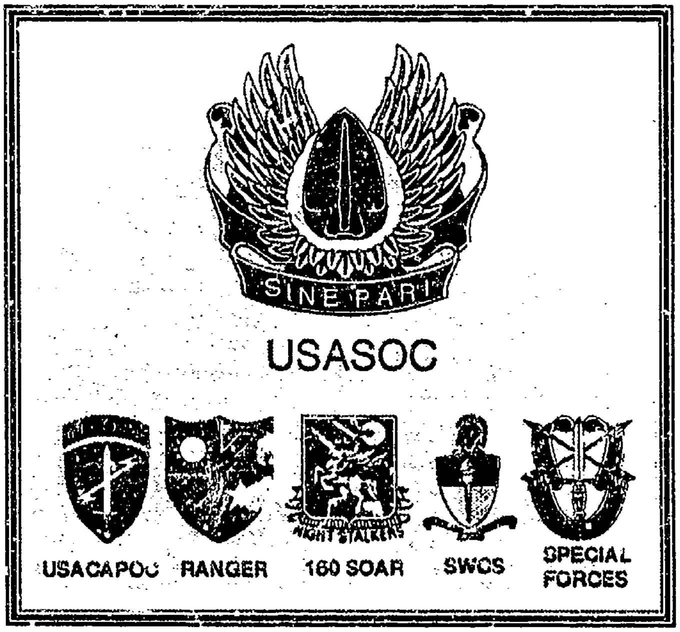


Figure T-1

Army SOF include Special Forces, Rangers, Special Operations Aviation, Psychological Operations, Civil Affairs units, and units designed to support and sustain SOF. Army SOF operate across the full range of military operations from peacetime to war.

Special Forces (SF) plan, conduct, and support special operations. Primary SF missions are Foreign Internal Defense (FID), Special Reconnaissance (SR), Unconventional Warfare (UW), Direct Action (DA), and Counterterrorism (CT). Collateral activities include humanitarian assistance, security assistance, personnel recovery, special activities, counterdrug operations, antiterrorism and other security activities, and support to coalition operations. Mission priorities vary from theater to theater.

Civil Affairs (CA) activities have three primary objectives: to support the commander's relationship with civil authorities and the civilian populace, to promote legitimacy, and to enhance military effectiveness. CA missions include civil-military operations and support to civil administration. Civil-military operations include foreign nation support, humanitarian assistance, population and resources control, military civic action, and civil defense. Support to civil administration addresses civil assistance and civil administration in both friendly and occupied territories.

Psychological Operations (PSYOP) develop and disseminate information designed to induce or reinforce attitudes and behavior in selected foreign target audiences favorable to U.S. national goals. PSYOP, a "nonlethal weapons system," can be strategic, operational, or tactical.

Rangers, relying on the elements of surprise, teamwork, and basic soldiering skills, can deploy rapidly by land, sea, or air to conduct direct action operations at company, battalion, or regimental levels.

Special Operations Aviation units provide extremely accurate heliborne lift and attack capabilities in a wide range of mission profiles, including force insertion and extraction, armed escort, target suppression and destruction, and resupply.

Special Forces, PSYOP, and CA units are particularly suited for operations other than war: nation assistance, foreign internal defense operations, combating terrorism, counterdrug operations, contingency operations, and activities involving international organizations. SOF participation most often occurs as an interagency effort.

Special Operations Forces provide a variety of capabilities and skills, all of which are especially well-suited for those missions that the U.S. is most likely to encounter in the future. The regional orientation of SOF provides culturally attuned, specially trained personnel for activities in sensitive political-military environments. Regional and language skills enhance their unique ability to work effectively and efficiently in a cross-cultural, international environment. SOF are ideally suited to assist other nations and have a primary capability to organize, train, advise, and assist security forces. The SOF capabilities include extensive medical skills, a wide range of sophisticated informational activities, and competence in civil-military operations.

Civil Affairs expertise encompasses such nonmilitary functions as agriculture, animal husbandry, community development, economics and commerce, education, public health, public information, public safety, and sanitation. Essentially, SOF are multi-talented problem-solvers whose special talents both include and transcend combat power. Thus, SOF have a range of capabilities to support a broad variety of U.S. policy options.

With expertise in a multitude of civilian and military fields which include engineering, communications, weaponry, tactics, medicine, instruction, organizations, and security, SOF provide versatile and particularly flexible capabilities to respond to a wide spectrum of political-military challenges, and to fulfill or contribute to a number of critical military roles and functions. The versatility, regional expertise, language capabilities, and relatively low profile of SOF are particularly valuable tools, especially when U.S. involvement within a region or country is a sensitive issue. In short, SOF are dependable, skilled, experienced, flexible, and ready forces that are more than capable to contribute to most military roles and functions.

SECTION 2

WARFIGHTING CONCEPT

This is an era of regional focus, fewer forward-based forces, decreasing resources, and growing uncertainty. In this environment SOF offer unique characteristics in support of U.S. defense strategy: as a force multiplier for conventional forces, as an expanded options force for decision-makers and as a force with unique capabilities.

Force Multiplier. SOF reinforce, augment, supplement, and complement conventional forces before, during, and after a conflict, which, in turn, increases the efficiency and effectiveness of our military effort. Early in an operation, SOF are used to prevent conflict and conserve resources. When conflict is imminent, SOF are deployed in a variety of prehostility missions to signal determination, demonstrate support to allies, and begin the complicated processes of positioning forces for combat and preparing the battlefield. During conflict SOF may be most effective in conducting economy-of-force options, thus generating strategic advantage disproportionate to the resources it represents. SOF locate, seize, or destroy strategic targets; obtain critical intelligence; test threat defenses, diminish threat prestige, disorganize, disrupt, and demoralize threat troops; and, divert important resources. SOF are also called on to speed the transition to a postconflict government and economy. SOF's facility to support coalition warfare is enormously important in the current security climate--one in which allies and friendly nations share the responsibility for worldwide stability and peace. Since SOF operates with conventional forces to maximize the capabilities of both, this combined operation provides synergy of operational effectiveness.

Expanded Options. SOF expand the options of the National Command Authorities, particularly in crises and contingencies--such as terrorism, insurgency, subversion, and sabotage--that fall between diplomatic initiatives alone and through the overt use of large, conventional forces. The small size capability to react rapidly and the self-sufficiency of SOF provide the U.S. with military options that do not entail the risk of escalation when larger, more visible, conventional forces are employed. SOF are the best choice for actions requiring rapid response or the surgically precise, focused use of force.

Unique Capabilities. Decision-makers may choose the SOF option because it provides the broadest range of capabilities that have direct applicability in an increasing number of missions--whether military, humanitarian, or peacekeeping--in support of U.S. foreign policy. Like conventional forces designed and organized for the direct application of military power, SOF are also deployed as a swift, deadly instrument of military force. They provide theater CINCs and country teams a wide range of capabilities. SOF afford an optimum economy of force while creating the least intrusive military presence.

Yet SOF also provide a highly effective, low profile means of fostering human rights and democratic values through humanitarian, peacekeeping, and nation assistance activities. Besides enhancing relationships between U.S. and host nation military forces, SOF's language and cross-cultural skills, combined with finely attuned political sensitivities, strengthen military-to-civilian interaction. Small, self-contained SOF units work swiftly and practically invisibly. Specifically, they do not project the noticeable presence created by conventional military forces. Moreover, they can operate in austere conditions, without the infrastructure typically required by a larger force.

Special Operations differ from conventional military operations in at least five ways:

One-Time Opportunity. SO missions--particularly direct action, counterterrorist, or hostage recovery contingency operations--must seize the appropriate moment for complete success. Their very nature dictates they must be done right every time, the first time. Opportunities are limited and short in duration. Due to the sensitivity of such operations, the penalties for failure--both political and military--are costly.

Unorthodox Approaches. SO missions do not negate the traditional principles of war. Rather, a different emphasis is placed on their combination of relative importance. In a SO mission surprise, speed, stealth, audacity, deception, and innovative tactics or techniques can be far more effective and efficient than traditional tactics based on massed firepower and tactical maneuvers.

Unconventional Training and Equipment. Attaining the SO objective often requires a unique mixture of specialized skills and equipment that may be outside the realm of conventional forces. The unusual demands of a SO mission define the specific training and equipment needed.

Political Sensitivity. Virtually every aspect of a SO mission is constrained by the politically sensitive context in which it is conducted. For instance, the cultural mores of a country may dictate a low profile operation, while in another situation, larger political considerations may require a very visible presence, say in an advisory capacity.

Need for Specialized Intelligence. SO missions are intelligence-driven and intelligence-dependent. They require immediate and continuous access to information from both traditional and nontraditional sources. SO generally rely on formal intelligence structures, but, for certain sensitive missions, tactical and operational information must be developed using SOF assets, such as advanced or reconnaissance forces. Moreover, SOF need detailed national and theater intelligence products at the tactical level of execution, most often in near real-time.

SO missions are shaped by one or more of these characteristics. If force is necessary to accomplish a mission, SOF employ it with precision and proportionality. In peacetime SOF support allies and friends with medical assistance, personnel

exchanges, and training. In crises SOF respond rapidly to help deter an aggressor or to stabilize situations. The latter could range from a natural disaster to the threat of war. Whenever possible, SOF deploy prior to hostilities, and assist friendly governments to achieve purposes congruent with U.S. interests.

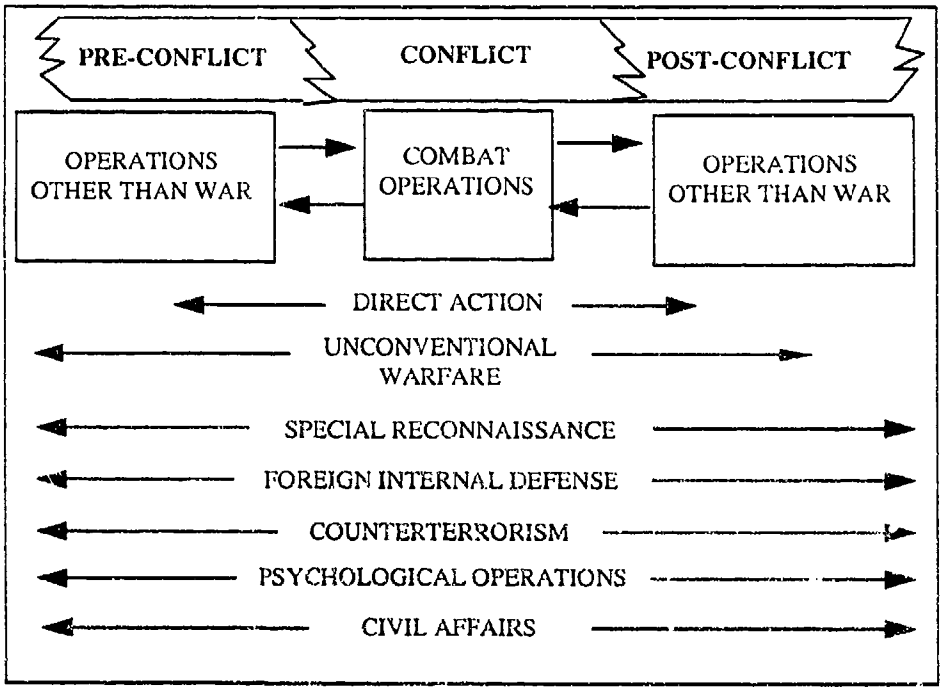


Figure T-2

The dramatic shifts in the national security environment continue to impact SOF missions and the ways in which SOF apply their capabilities. This underscores the need for continuing investment in Science and Technology (S&T). Increasingly, SOF depend on S&T to provide critical advantages to support increased participation in a growing number of challenging missions from regional peacekeeping to combating drugs to counterproliferation. Not only must SOF be especially sensitive to mission context and objectives, but they must also have the technological advantages to combat the increasingly sophisticated measures used by adversaries.

To meet tomorrow's challenges, SOF must deliver people, equipment, and weapons with surgical precision; locate high-value, strategic, movable targets; and deliver firepower more accurately with less collateral damage and injury to civilian populations. They also need less-than-lethal, nondestructive technologies to further expand their options while conducting their missions. Further, the proliferation of electronic sensor systems among previously ill-equipped adversaries compels SOF to move faster and farther without being detected. In addition, the growing number of operations conducted at night and under adverse weather conditions calls for more sophisticated sensors as well as direction finding and enhanced vision equipment. Also, SOF missions and collateral activities increasingly require interaction with diverse joint and multinational coalition forces along with a corresponding need to acquire and

transfer large amounts of information reliably, securely, and in real time. Since SOF usually operate in small, self-sufficient units, there is a continuing need for smaller and lighter systems and technologies for the individual soldier.

In the future the demand will be greater than ever for forces that can selectively respond to diverse regional concerns. While traditional mission activities will remain relevant, sweeping changes in the international environment will likely increase the number of SOF collateral activities with a broader range of missions. Possibly some of the collateral activities will take on greater importance in the decade ahead.

The diverse capabilities and rapid response of SOF are invaluable in humanitarian assistance and disaster relief missions. Especially important in these missions is the communications capability that SOF can field quickly, even in remote areas. With rapidly established communications, relief efforts can be directed efficiently and effectively. During domestic emergencies routine coordination between SOF and law enforcement agencies facilitates quick action to provide security, shelter, food, and comfort to those in need. Overseas, SOF trained to operate in specific regions quickly integrate their efforts with those of host governments and international relief organizations.

Recent United Nations actions around the world have demonstrated the expanding role of military activities in maintaining peace. Peacekeepers in the past have served mainly as observers among consenting factions. Today, peace operations encompass restoring and maintaining order, disarming militia, and overseeing free elections. SOF bring intercultural and language skills to help facilitate a coordinated, multinational approach to conflict resolution. SOF contribute to peace operations through their CA and PSYOP activities, as well as the use of uniquely qualified personnel in skill-specific operations. To increase their effectiveness, SOF will rely on: new technology to improve intelligence and reconnaissance capabilities; new mobility platforms to better enforce neutral zones and maritime embargoes; and improved weapons with greater precision and less collateral damage for defensive use in peace operations.

SOF provide cost-effective means of deterring and countering the proliferation of weapons of mass destruction. SOF possess unique capabilities to monitor and support compliance with arms control agreements, and, if diplomatic or political nonproliferation efforts fail, to conduct or support direct action. Operating in small units and equipped for independent action, SOF can carry out measures to interdict sea or land shipments of dangerous material or provide deep reconnaissance to locate weapons of mass destruction and conduct or aid precision strikes to destroy them.

Regional factionalism, religious extremism, and fervent nationalism will continue to fuel terrorism as a means of achieving political ambitions. Proliferation of sophisticated and increasingly more lethal technologies increase the potential danger of international terrorism. Americans, both at home and abroad, will continue to be in jeopardy from terrorist threats that are impossible to predict with accuracy. SOF will

depend on advanced communications and on specialized surveillance and intelligence systems which are tied to other national assets that will enhance coordination of efforts and maximize effectiveness in protective measures and counterterrorist operations.

Combating the spread of illegal drugs will remain a major national security concern. To the extent permitted by law, SOF will lend operational and training assistance to U.S. federal, state, and local law enforcement agencies and to other nations, particularly in special reconnaissance and surveillance technology and techniques. Future surveillance, communications, and mobility systems will remain critical to this mission.

With increased emphasis on regional overseas presence and crisis response strategies, security assistance will be a major element of defense policy and long-range planning. SOF will continue to participate in activities such as promoting coalition cooperation, establishing forward presence, training friendly forces, developing military-to-military liaisons, encouraging democracy and human rights, and providing humanitarian assistance.

Although the conventional forces have the responsibility to search and recover downed or stranded personnel, the unique capabilities and training of SOF units may be called upon when requirements exceed the recovery capability of conventional forces. The effectiveness of SOF units in this activity will be enhanced by longer range mobility platforms as well as specialized communication, sensor, and surveillance technologies.

In the coming decade, emphasis on the global environment and regional ecology will increase considerably. SOF may be called upon to provide other nations with training and support in preserving their regional biodiversity and ecology especially with small patrol craft and advanced sensor and surveillance techniques.

The warfighting concept for SOF flows from four basic truths:

- People are more important than hardware.
- Quality is better than quantity.
- Special Operations Forces cannot be mass produced.
- Competent SOF cannot be created after emergencies occur.

For now and well into the next century, SOF will continue to provide the warfighting regional CINCs, U.S. Country Teams, and standing Joint SOTFs with a flexible, seamless force that have both regional and worldwide orientation and capability, and tailored and trained to conduct special operations in support of national objectives.

SECTION 3

CURRENT PROGRAM ASSESSMENT

Special operations are conducted by active and reserve forces specially trained, equipped, and organized to engage in strategic and tactical operations in pursuit of national, military, political, economic, or psychological objectives. These operations are performed during periods of peace or hostility, and are prosecuted independently or in support of conventional operations. SOF-only operations are especially critical when the use of general purpose forces is either inappropriate or infeasible. In addition, SOF are employed in peacetime military activities requested by, and in support of, Third World governments aimed at fostering political legitimacy, democratic values, and viable civil infrastructures.

To ensure SOF's rapid employment and successful performance, SOF must be provided with the most modern equipment available. SOF modernization philosophy emphasizes high readiness for worldwide rapid response, sufficient sustainment, enhanced mobility, and efficient command and control capability. The goal is to provide SOF equipment which is interoperable in the joint arena and increases the probability of mission success. This includes both Army common equipment items and unique operational equipment necessary to support the diverse requirements of Special Forces, Civil Affairs, Psychological Operations, Rangers, and Special Operations Aviation. Prudent innovation is a recurring need. SOF modernization must include the new and emerging technologies to allow its forces to accommodate and confront the challenges of the changing global environment.

Technological innovations are pursued to overcome SOF's intrinsic disadvantages in size and firepower. SOF versatility and readiness rely on simplicity, mobility, rapid response, daring, and surprise. Operations require secrecy and deception during planning to ensure low visibility during execution. The conduct of SOF missions is often high risk. Personnel and equipment are selected specifically for each operation.

High technology research and development are key to SOF modernization. Special emphasis is given to developing **improved mobility, flexible command and control systems, enhanced night vision capabilities, and integrated communications systems** for all forces at each level of command. These enhance the ability of SOF to respond rapidly and conduct synchronized deep penetrations into denied areas. The exploitation of technology by SOF is enhanced by its relatively small size, and its shorter decision and execution timelines. SOF research and development programs are carefully designed and monitored. A primary challenge in this area is to discriminate among emerging technologies and select only those that provide the greatest benefit for the resources expended.

Special operations and Army research and development programs must be closely coordinated to prevent duplications of effort, yet take advantage of shared capabilities. SOF rely on a close partnership with the Army for common equipment items. SOF are particularly interested in Army programs involving:

- Enhanced Manpack UHF Terminal;
- Family of Medium Tactical Vehicles;
- Thermal Weapons Sights;
- Soldier Enhancement Program;
- Psychological Operations Equipment;
- Intelligence Dissemination Systems;
- Battery Technology;
- Joint Service Small Arms Program (JSSAP);
- Intelligent Minefield (IMF);
- Nonlethal Weapons;
- Breaching Buried Mine;
- Guidance system for high altitude personnel parachuting;
- Nonelectric Field Refrigerator;
- Remote Agent Detector;
- 21st Century Land Warrior Top Level Demo/Generation II Soldier ATD;
- Lightweight Personnel Armor; and,
- Auditory Enhancement Devices for Soldier.

Currently, SOF are sharing information with the Army about:

- Pursuit Deterrent Munition;
- Selectable Lightweight Attack Munition;
- Penetration Augmentation Munition;
- SOF Demolition Kit;
- Internal Aircraft Fuel Tanks;
- M4 Carbine;
- Improved Remotely Monitored Battlefield Surveillance System;
- Planning and Rehearsal Systems; and,
- Nonmateriel Individual Enhancement of SOF Operators (NIESO).

SECTION 4

RESEARCH, DEVELOPMENT AND ACQUISITION STRATEGY

Research, development and acquisition strategy (RD&A) programs are less extensive than other Army mission area programs because most Army Special Operations are people-oriented rather than platform-oriented. The ARSOF RD&A strategy is to participate in Army-common RD&A programs to satisfy ARSOF requirements whenever possible, and likewise, to participate in SOF-peculiar RD&A programs only when common items do not provide the required capabilities. Many SOF-peculiar RD&A programs are pursued as joint programs.

ARSOF mission parameters, smaller unit size, environmental extremes, and isolation from conventional support require modernization efforts to acquire improvements in mobility, sustainment, lethality, survivability, and command and control. ARSOF units must be self-contained with respect to near real time intelligence, communications, and medical capability. Technology must help ARSOF become smarter, lighter, less detectable, and more self-sufficient.

USSOCOM TECHNOLOGY GOALS

March 11, 1994

1. WMD and NBC detection and protection system.
2. Lightweight survival, sustainment and personal equipment.
3. Lightweight low volume power supplies.
4. High-speed, low-detectability infiltration/exfiltration and support mobility platforms.
5. Improved C4 System.
6. Mine, Explosive, and Booby-trap detection and neutralization.
7. Target locating, tracking, and marking.
8. Nonlethal to lethal tunable Weapons.
9. Enhanced Explosive Charges and Munitions.
10. Multi-spectral, advanced Vision Devices/Sensors.
11. Miniaturized guided Projectiles.
12. Information Warfare and Command and Control Warfare.
13. Day/night Sights and Fire Controls for SOF Weapons.
14. SOF Resupply Systems.
15. GPS Exploitation.
16. Future Force Application Weapons and Munitions.
17. Advanced Teaming/Training Systems, Mission Rehearsal Systems, and Virtual Reality Systems for Mission, Planning and Training.
18. Underwater Adhesives and Attaching Systems.
19. Speech Translators.
20. Civil Affairs Related Systems.

Figure T-3

On March 11, 1994 the U.S. Special Operations Command (USSOCOM) established technology requirements and goals listed in order of priority. Most of the goals are reflected by ARSOF RD&A programs. In some cases such as the "high speed, low detectability infiltration/exfiltration and support mobility platform," ARSOF does not have the lead on the program, although ARSOF is participating to ensure that its requirements are satisfied. The SOF Technology Base Development program

targets initiatives designed to advance technologies that meet critical SOF needs. Selected programs comprising SOF advanced technology development are highlighted in the Figures to follow.

Modern technology provides the essential advantage for many special operations, and SOF employ an extensive inventory of sophisticated weapons and technology. SOF and Service materiel developers must closely coordinate materiel acquisition programs to preclude duplication and to take advantage of shared capabilities. Often SOF units act as a proving ground for new equipment. USASOC units are an excellent force to test new technologies because these units consist of relatively small numbers of soldiers who are frequently deployed and operate in diverse and demanding environments. In some cases systems developed to satisfy ARSOF requirements are later deemed useful to conventional Army forces. In such cases the systems are procured as Army-common items in more economical quantities. ARSOF evaluations of new systems typically better serve the needs of all users. Emerging technologies applicable to ARSOF modernization efforts must be applied effectively to the force structure and doctrine. The human and organizational dimension of the military technical revolution will also require adjustments.

ARSOF modernization includes reviews of Force Structure; Mobility; Intelligence; Training, Operations and Combat Systems; Logistics; Command, Control, Communications and Computers (C4); Medical Organizations, Training and Materiel; and Modernization of ARSOF Facilities.

SPECIAL OPERATIONS AIRCRAFT
MH-47E/MK-60K MODIFICATIONS

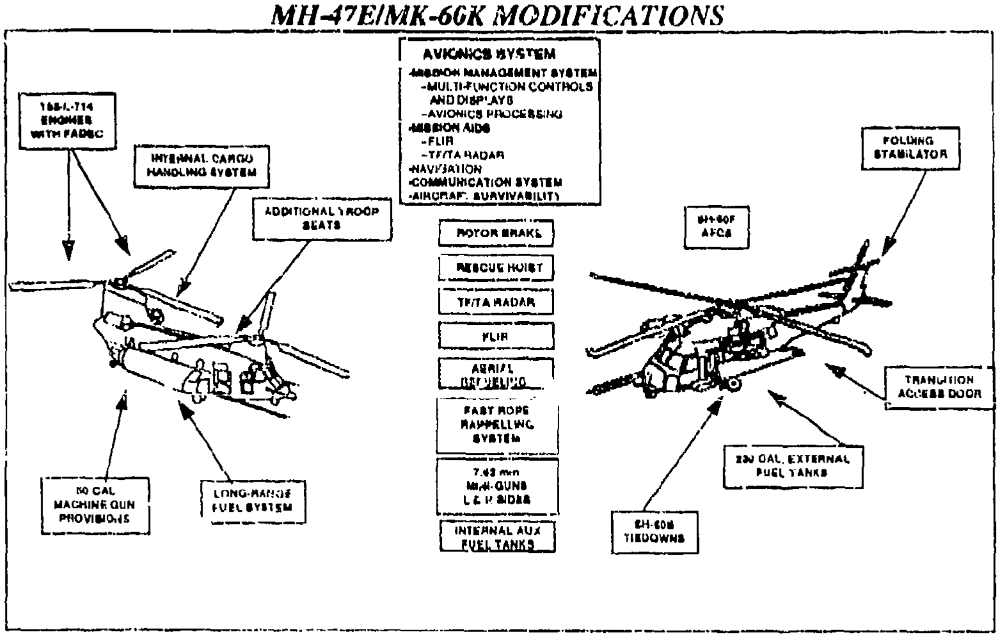


Figure T-4

Modernization of ARSOF mobility includes aviation (by far the largest part of the program in cost and complexity), ground mobility, aerial delivery and air infiltration, maritime (including SCUBA), and ground nonvehicular. Modernization includes:

ARMY SPECIAL OPERATIONS AVIATION

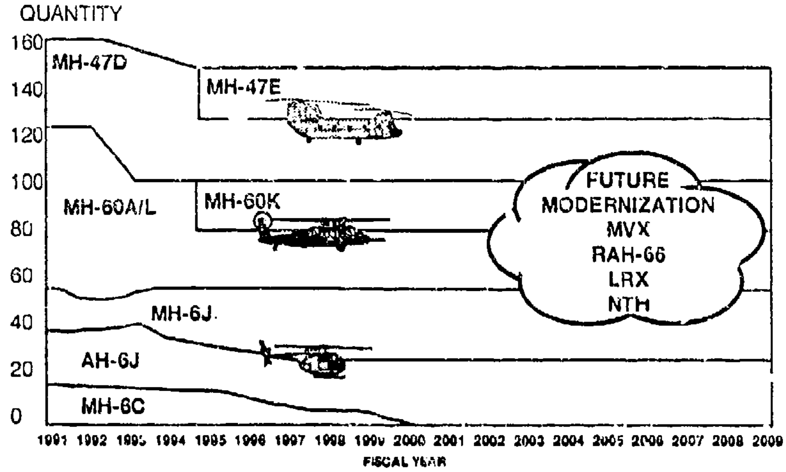


Figure T-5

- SOF-peculiar modifications to aircrafts to enhance their effectiveness and survivability in infiltration missions;

- Continued modifications to reduce aircraft weight and increase range, payload, and airspeed over current capability;

- Enhancements to ground mobility (a result of Desert Storm experience);

- SOF-peculiar aspects of nonvehicular mobility by land, sea and air;

- Establishing force structure, funding, and command relationships necessary to meet aviation mobility requirements for Rangers and Special Forces when in support of both special and conventional operations;

- Support the USSOCOM effort to integrate Special Operations Forces Planning and Rehearsal Systems with Mission Rehearsal Devices and the USSOCOM planning and rehearsal facility (SOFPREP);

- Establish requirement for follow-on MH/AH-6 capability and the platform necessary to provide that capability; and,

• Determine requirements for follow-on medium range capabilities and platforms.

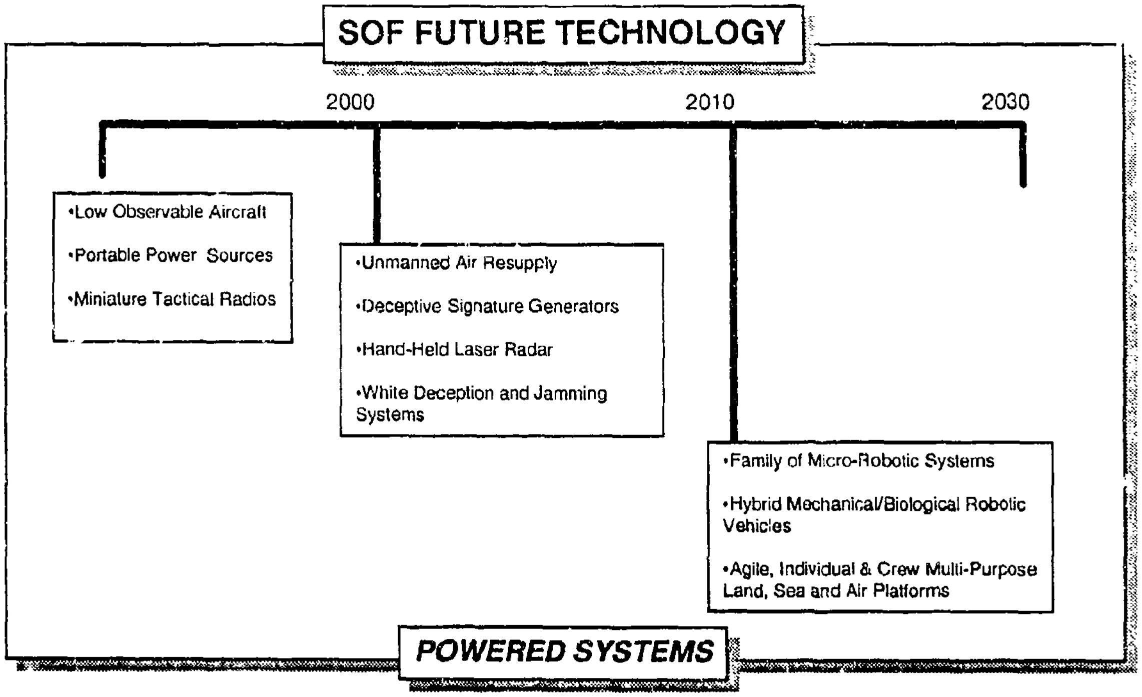


Figure T-6

Modernization of ARSOF intelligence operations and materiel includes:

• Develop, operate, and enhance an ARSOF Intelligence Automation Architecture;

• Provide ARSOF timely selected secondary imagery through the SOCRATES network;

• Develop and field the Special Operations Forces Intelligence Vehicle (SOF-IV);

• Develop and field a lightweight man-portable system to directly receive near real time (NRT) imagery at field locations· and,

• Create a lightweight collection and direction finding system for SOF.

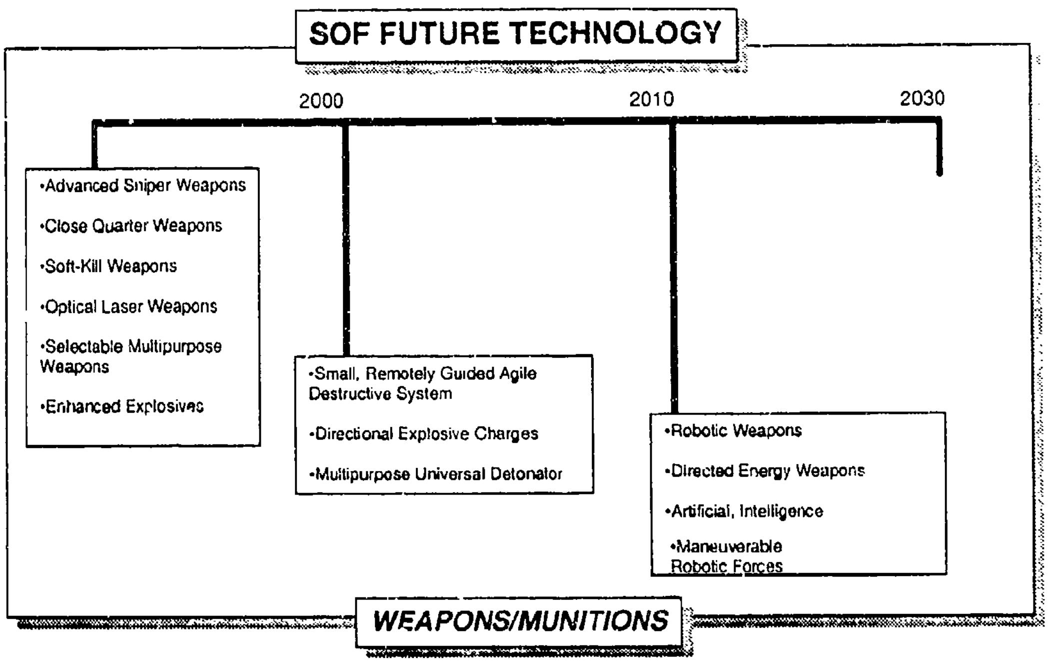


Figure T-7

Modernization of ARSOF operations and combat systems, weapons, demolitions, and psychological warfare equipment, includes:

- Technological advances to augment language capabilities;
- Special Operations Forces Chemical Alarm System;
- SOF Countermine and Demining Equipment System;
- Improved Night Observation/Fire Control Device;
- Special Operations-Peculiar Modification to the M-4 Carbine;
- Heavy Sniper Rifle;
- Selectable Lightweight Attack Munition;
- Enhanced Incendiary Grenade;
- Explosive Detector;
- Stand-Off Destruction Munition;
- Family of Sabotage Devices;

- SOF Enhanced Moldable Explosive Charge;
- Penetration Augmented Munition;
- Remote Activation Munition System;
- Unmanned Aerial Vehicle Payload-Mobile Broadcast Extender Repeater Station;
- PSYOP Print Development Workstation;
- Special Operations Media Systems; and,
- Psychological Operations Automated System.

Modernization of ARSOF logistics includes:

- Develop Initial Preplanned Supply Support System (IPPS) to support two simultaneous theater deployments;
- Integrate the Special Operations Forces Support Activity (SOFSA) into Army Special Operations Force logistics practices; and,
- Continue modernization of Army Special Operations Forces logistics automation architecture.

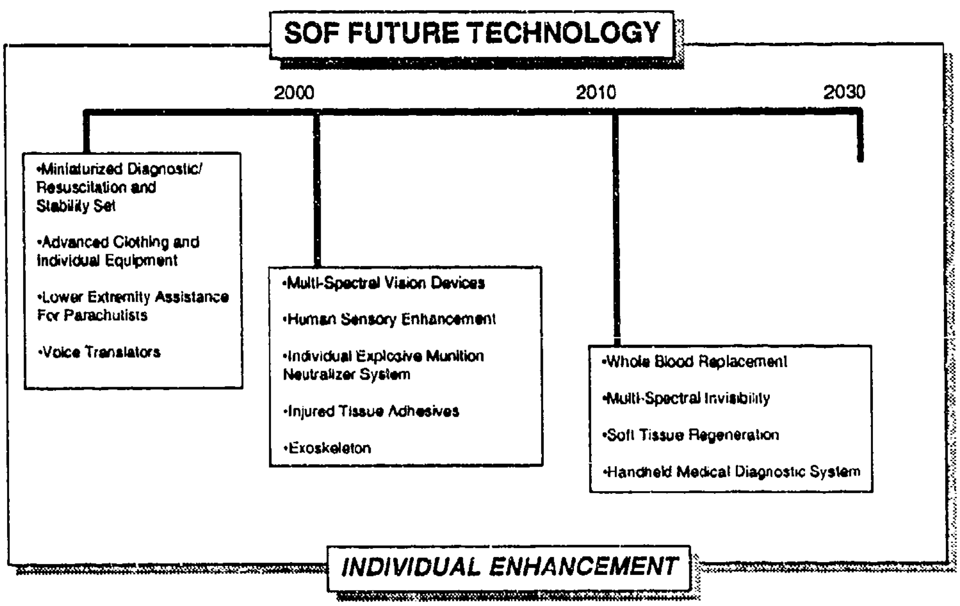


Figure T-8

Modernization of ARSOF Command, Control, Communications, and Intelligence (C4I) systems is driven in part by the C4I Master Plan which will be finalized later this year. The C4I Master Plan includes:

- Enhanced Manpack UHF Terminal;
- Improved Battery and Power System;
- Improved Special Operations High Frequency Manpack Radio System;
- Special Forces Base Station;
- HF Multi-channel (AN/TSC-122) Improvement;
- Tactical Satellite Radio;
- Downsized SHF Antenna; and,
- Portable Lightweight SHF Terminal.

Modernization of ARSOF medical support includes:

- Develop ARSOF medical doctrine and Programs of Instruction (POI's) pertaining to medical support;
- Establish the Special Operations Medical Training Center (SOMTC), and
- Modernization of ARSOF medical equipment sets, kits and outfits.

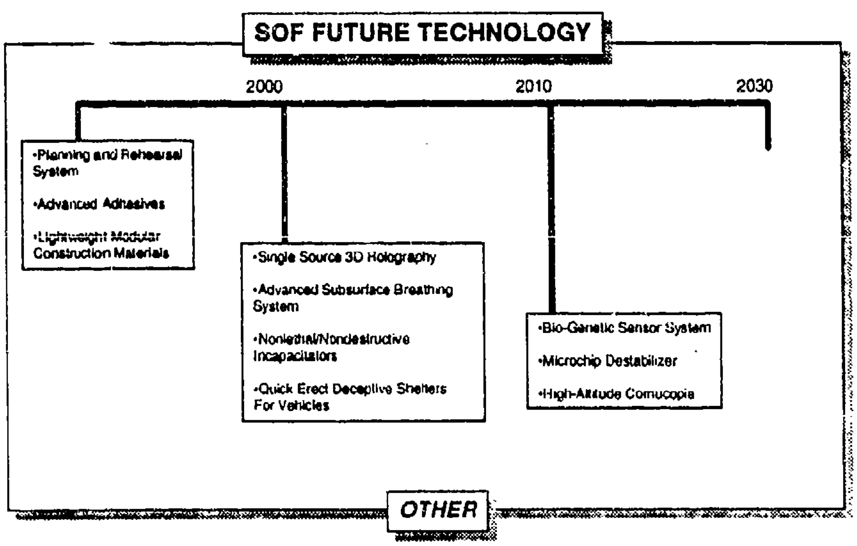


Figure T-9

SECTION 5

TRAINING

Special Operations Forces are carefully selected, highly trained, skilled professionals. SOF training emphasizes the individual soldier who must have regional knowledge, intercultural skills to include language proficiency, and the ability to adapt to the challenges of the information age and the dynamics of rapid technological changes. SOF training involves specialized training, training with conventional forces, and joint training with conventional forces and SOF components. Special Forces, PSYOP, and CA units are regionally oriented on specific areas of the world. This requires expertise in the culture, language, traditions, geography, infrastructure, politics, and environmental conditions of a particular area. SOF units deploy rapidly, often with little train-up, and must be immediately effective when they arrive. SOF units integrate joint teams at the lowest levels. An Army Special Forces A detachment working with Air Force combat controllers and Navy SEALS can put together a team to train several kinds of host nation forces in multiple environments or conduct complex contingency operations without having to spend long train-up periods before deployments. SOF air and maritime mobility assets deliver SOF teams to any location in the world on short notice and under adverse conditions.

The Combined Arms Training Strategy (CATS) provides SOF with the means to identify training requirements and to develop, acquire, and manage training resources. Future strategy will incorporate maneuver, gunnery, and leader training in combined arms and joint/multinational environments using the integration of live, virtual, and constructive simulations to link training of soldiers at all levels. Technology enables SOF to train in virtually any environment, including representations of the operational theaters of war. Training takes place in synthetic local training areas, combat training centers, or on virtual representations of the operational mission area.

Leader training, especially mid-career professional development, is critical. SOF leaders must possess tactical and technical skills, must integrate Special Operations Forces into joint operations, and must understand the unique requirements of peacetime military activities. Integrating special operations capabilities into computer-driven command post exercises and battle simulations enhances the training and tactical proficiency of both conventional and special operations leaders.

Computer simulations significantly improve analysis, education, training, and operational readiness, and are a cost efficient means to develop SOF leaders, embed doctrine, provide feedback on unit and individual tactical and operational effectiveness, and provide data to improve doctrine, organization, training, materiel, leadership, and soldiers.

Simulations substantially improve integration of SOF in conventional, joint, multinational, and coalition forces operations. Modernization of computer simulations will

include the development of models which address the full range and potentiality of SOF capabilities. Adding more PSYOP and CA functions will improve the value of simulations to PSYOP and CA unit training and dramatically demonstrate their significant value to conventional force commanders.

The present trend of using training simulations to support SOF mission planning, evaluation, and rehearsal will continue. Next generation simulations will have the following characteristics: highly portable (capable of infiltrating with an operational detachment) and simple to use systems capable of supporting training, planning, rehearsal, and mission execution tracking from the operational detachment level through the Special Operations Task Force.

Modernization will eliminate the present time-consuming process of producing simulation terrain data bases. Rapid terrain data base construction for simulation-supported training, mission planning and rehearsal, and execution will permit quick preparation for a broad range of missions and collateral activities in little known regions. Simulation modernization will include emerging computer technology of 3D terrain visualization which permits commanders to "see" the operational area.

Future computer simulation must eliminate the divisions and incompatibilities of current Service and joint simulations that preclude the seamless portrayal of SOF. The "jointness" of SOF requires simulations that combine air, naval, and land simulated environments to support future SOF mission training, planning, rehearsal and execution.

Experience demonstrates that motivation, training, and the high caliber of the individual SOF soldier contribute most significantly to SOF's readiness and success.

SECTION 6

CONCLUSION

The global interests of the U.S. and the growing complexity of the international environment demand Special Operations Forces that are versatile, trained, and ready for unprecedented challenges in the future. As integral members of the joint team, SOF provide the National Command Authorities and the theater CINCs a range of options to deal with the challenges that they are most likely to face in the future. These challenges range from specialized peacetime operations to equally specialized conflict and postconflict support. SOF effective employment in any country is possible because of SOF's low profile, their ability to accomplish much with few people, their reduced support requirements, and their intercultural skills.

The distinctive capabilities and characteristics of SOF rest on five fundamental principles that prepare the Force for any mission. First, SOF require **high quality and mature soldiers**. Second, they require **intense training.** Third, highly **advanced technology** give SOF the specialized capabilities which their varied mission areas require. Fourth, **forward-looking doctrinal development** and finally **versatile force structures** ensure training and technology remain focused on future threats and missions.

Army Special Operations Modernization Planning emphasizes research and development efforts of the various Service departments. SOF, Army and other Service research and development programs must be closely coordinated to preclude wasteful duplications yet take advantage of shared capabilities. Wherever possible, non-developmental items will be procured to save time and program cost. The Special Operations Technology (SOST) program will be used for fast prototyping of specialized items. In other cases the classic materiel development process is most appropriate to provide needed modernization.

Special modernization emphasis is given to developing improved mobility programs, flexible command and control systems, enhanced night vision capabilities, and integrated communications systems for special operations and conventional forces at every level of command. These programs enhance the ability of SOF to respond rapidly and to conduct synchronized, deep penetrations into and out of denied areas. Technological exploitation is enhanced by the relatively small size of the special operations community, enabling shorter decision and implementation timelines. A primary challenge in this area is to discriminate among emerging technologies in order to select those that provide the greatest benefit for the resources expended.

Versatility and technology must be emphasized to overcome SOF's intrinsic disadvantages in size and firepower. When employed properly and synchronized with other battlefield assets, SOF are combat multipliers because SOF provide commanders

with capabilities that extend their vision of the battlefield, increase their flexibility, and enhance their initiatives.

The foundation of SOF readiness rests primarily on the combination of two of the fundamental principles of SOF: continuing to select the best people provided by the Army, and exploiting appropriate technologies. These principles cannot be compromised. Any compromise of these guiding principles means the price of success in future conflicts, in terms of lives lost and resources expended, will increase dramatically.

In the final analysis, the high quality, unique skills, maturity and determination of SOF compel their employment for meeting the challenges of the future. SOF, as integral members of the U.S. joint defense team, continue to make significant contributions to U.S. national security.

ANNEX U

NATIONAL MISSILE DEFENSE

ANNEX U

NATIONAL MISSILE DEFENSE

SECTION 1

INTRODUCTION

"Our missiles cannot reach Washington. If they could reach Washington, we would strike it if the need arose."
Saddam Hussein

The United States does not now have the military means to **defend the American Homeland** against long range ballistic missiles capable of delivering weapons of mass destruction. The National Missile Defense (NMD) System, when deployed, will provide this capability.

The U.S. National Security Strategy stresses that the proliferation of weapons of mass destruction represents a major threat to our national security and the security of our allies and other friendly nations. It places a high priority on countering the proliferation of such weapons – nuclear, biological, and chemical. The U.S. seeks to deter the acquisition of weapons of mass destruction and the means to deliver them (i.e., ballistic missiles) by nations which do not now possess either, or both. This includes continued reliance on arms control agreements, such as the Anti-Ballistic Missile Defense Treaty. Should these efforts fail, U.S. National Security Strategy requires U.S. military forces to defend and protect the Nation against ballistic missiles.

The National Military Strategy of the United States derived two strategic objectives from the National Security Strategy – promoting stability and thwarting aggression. Figure U-1 depicts these objectives.

National Strategic Military Objectives

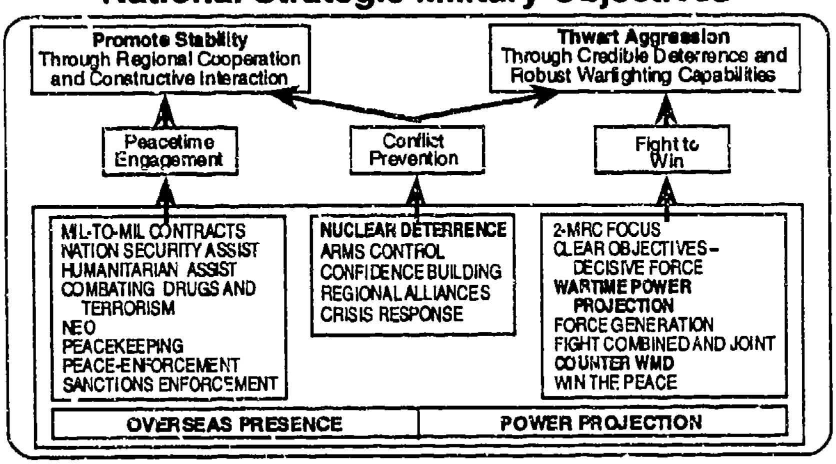


Figure U-1

The National Military Strategy calls for thwarting aggression through credible deterrence and robust warfighting capabilities. U.S. military forces must be capable of deterring attacks, including those involving weapons of mass destruction, against the U.S., its forces (wherever deployed), and its friends and allies. An objective of the National Military Strategy is to strengthen U.S. defensive capabilities against such weapons and their delivery means. Demonstrating a capability to defend against and defeat attacks involving weapons of mass destruction can serve to deter their acquisition and use by other nation states.

The National Military Strategy calls for a potent power projection capability to prevent conflict and to respond quickly to regional crisis and war. The declining size of forces permanently stationed overseas requires a corresponding increase in capability to project CONUS-based forces. At the same time, the military strategy recognizes that weapons of mass destruction in the hands of hostile regional powers directly challenge the deterrent capability of U.S. conventional forces and raise the potential costs and risks of power projection operations. Therefore, the U.S. must have the military capability to counter weapons of mass destruction.

The National Military Strategy dictates that the combat forces and supporting capabilities be built on the five fundamental foundations identified in Figure U-2.

Foundations of National Military Strategy

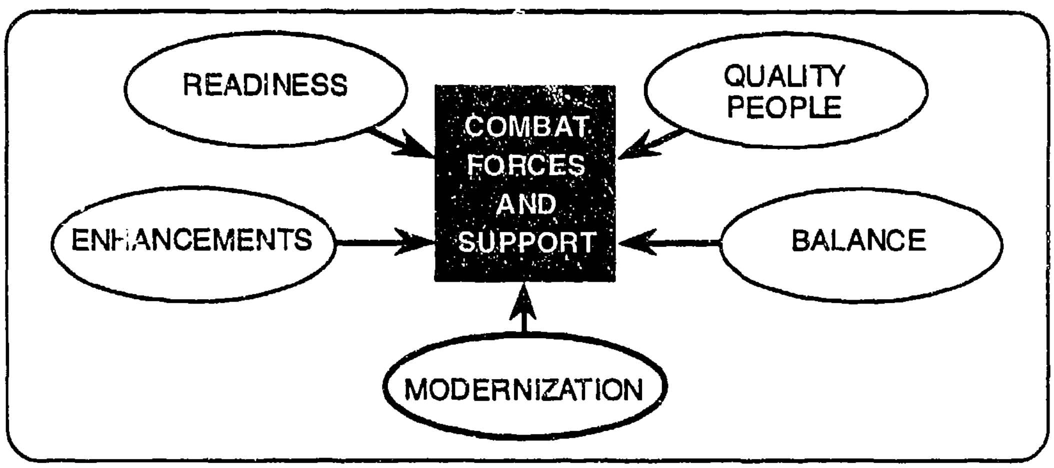


Figure U-2

The Army's modernization vision is to field a 21st Century power projection force capable of Land Force Dominance under any conditions. The Army will achieve Land Force Dominance by accomplishing its five modernization objectives:

- Project and Sustain the Force;
- Win the Information War;
- Protect the Force;

- Conduct Precision Strike; and,
- Dominate the Maneuver Battle.

The Army's modernization plan supports the above objectives through aggressive development of both theater and national missile defenses. This annex provides the rationale for the Army's National Missile Defense (NMD) modernization program, funded by the Ballistic Missile Defense Organization (BMDO).

Currently, the United States has no military means to defend against long-range ballistic missiles carrying weapons of mass destruction – Intercontinental Ballistic Missile (ICBM) or Submarine Launched Ballistic Missile (SLBM). Consequently, the U.S. is vulnerable to attack by any nation or group having, or acquiring, such a capability. Currently, China and Russia have ICBMs capable of reaching the U.S. Three other states of the former Soviet Union (Ukraine, Kazakhstan, and Belarus) also possess nuclear-capable ICBMs.

Although the Cold War is over, troubling uncertainties regarding regional stability remain. The newly independent states of the Confederation of Independent States are experiencing wrenching economic and political transitions, as are many of the new democracies in Central and Eastern Europe. Russia's future is uncertain, and China maintains a repressive regime even as that country assumes a more important role in global affairs. Considering the massive internal political and economic upheaval underway in the former Soviet Union, the U.S. must remain alert regarding the security and accountability of all nuclear warheads and weapon systems.

Even more troubling are pursuits by Third World countries to develop weapons of mass destruction and long-range delivery capabilities. Central Intelligence Agency assessments indicate that by the turn of the century several Third World countries could have the means to develop both weapons of mass destruction and long-range ballistic missiles. Alternatively, such countries could procure either the missiles or major components for the warheads from countries that already have these technologies.

States such as Iraq, Iran, and North Korea aggressively pursue policies designed to make them dominant in regional political and military affairs, posing increased risks for the U.S. and its allies. Long-range ballistic missiles are the likely delivery means for weapons of mass destruction by hostile Third World countries.

The missiles use available technology, require little supportability, almost no training, and are low in cost. These characteristics and the strategic advantage gained by using them to threaten key military, civilian, and cultural targets in the U.S. and elsewhere, make such weapons particularly attractive to Third World nations. Some such countries have shown an interest in developing their own weapons of mass destruction. If a country has the capability to put a satellite in space, they have the capability to deliver such weapons.

Without an adequate strategic ballistic missile defense, the consequences to this country of a rogue nation obtaining an ICBM capability are unacceptable. With global instability on the rise, the United States could become severely limited in its ability to enact power projection operations if a hostile nation has weapons of mass destruction with long-range ballistic missile delivery capability. The recent effect upon Japan when North Korea threatened to use its long-range Theater Ballistic Missiles (TBM) is noteworthy. While the United States is relatively secure from TBM threats in the near future, strategic nuclear blackmail is possible given the number of countries possessing the means or expressing the desire to have such capabilities. The United States may have been less willing (and able) to project its military power during the Gulf War if Saddam Hussein had weapons of mass destruction and long-range ballistic missiles. A single one megaton nuclear warhead detonating on one of our major cities would produce more casualties than all our conflicts since and including World War II. In addition, the economic damage estimates approach a trillion dollars. **Saddam Hussein and Muammar Qadhafi have both indicated that if they had the means to strike this nation with missiles, they would do so if the need arose.**

The goal of the NMD modernization program is to develop and test a limited NMD System, as rapidly as available funding permits. The NMD goal adds credence and technology to the Army's modernization objectives of Protect the Force and Project and Sustain the Force. The NMD System would safeguard the National Command Authority (NCA), shield the nation's industrial and economic bases, and provide cover to CONUS-based military units. NMD, when deployed, will also provide the NCA and military leaders with freedom of action in Conduct Precision Strike, Win the Information War, and Dominate the Maneuver Battle against those who threaten to attack the American heartland with strategic ballistic missiles. NMD further supports national security and military strategies by deterring the development and proliferation of weapons of mass destruction and limiting ballistic missile delivery systems by other nations.

NMD is a multiservice program, managed by the Ballistic Missile Defense Organization, in response to Congressional mandates to develop and provide contingency capabilities for strategic ballistic missile defense. In 1991, Congress passed the Missile Defense Act; it calls for the deployment of an NMD system. The OSD Bottom-Up Review of September 1993 placed the NMD program second in priority (after the Theater Missile Defense (TMD) program) for funding and development. In the 1995 Defense Authorization Bill, Congress directed the Department of Defense to develop and demonstrate a limited, prototypical NMD system for contingency deployment should a threat appear more rapidly than currently forecasted.

In 1992, the Army Chief of Staff, placed NMD and TMD among the Army's six strategic roles for national defense. At present, the Army has the lead in the development and testing of the interceptor, radar, and associated BM/C3 technologies to support incremental demonstration of the NMD system.

The NMD Program is unique due to its developmental approach to establish contingency acquisition and deployment capability. It is specifically oriented to the fulfillment of national security and military strategic objectives for strategic defense of the nation. Designed to demonstrate contingency capability as soon as possible, it will continue, over time, to develop more robust system capabilities by incrementally addressing and resolving the key system challenges associated with countering evolving threats.

Using existing technologies and leveraging the substantial investment in Theater Missile Defense systems, the Army is fabricating prototypical NMD System hardware. This hardware is the Exoatmospheric Kill Vehicle (EKV), the Radar Technology Demonstrator (RTD), and the Battalion BM/C3 Demonstrator (BBD). All test hardware is traceable to contingency deployable User Operated Evaluation System (UOES) type NMD configurations.

The far-term or objective NMD system, defined by the Ballistic Missile Defense Organization (BMDO), includes: Ground Based Exoatmospheric Interceptors (GBI); a ground-based National Defense Radar (NDR); a BM/C3 capability; and a constellation of Space and Missile Tracking Satellites (SMTS) – formerly called Brilliant Eyes. Figure U-3 depicts the BMDO objective NMD system. Based upon an emergency deployment decision at any time, the U.S. Army could acquire, field, and operate a ground-based NMD system consisting of interceptors, radars, and associated BM/C3. The system will operate with the rest of the NMD elements and protect the U.S. against a "limited" ICBM or long-range SLBM attack. The definition of a "limited attack" is "few" re-entry vehicles with simple penetration aids.

The Far-Term or Objective NMD System

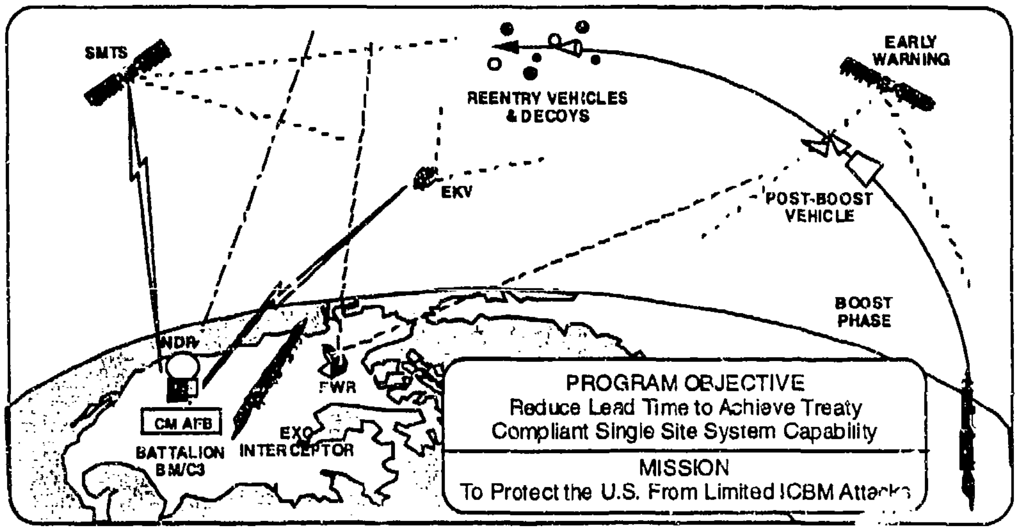


Figure U-3

SECTION 2

WARFIGHTING CONCEPT

"If we had possessed a deterrent - missiles that could reach New York we could have hit it at the same moment."
Muammar Qadhafi
(Remarks on the 1986 U.S. Air Strike)

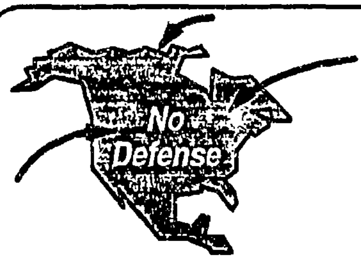
THREAT

To assure our survival as a nation and our freedom of action in responding to conflicts where U.S. interests are at stake, the capability to protect the U.S. homeland against weapons of mass destruction delivered by ballistic missiles is critical. While direct nuclear attack against the American homeland today is considered improbable, missiles armed with nuclear warheads could strike the United States. Given the proliferation of weapons of mass destruction and their associated means of delivery, the U.S. must be prepared to defend itself against such attacks.

There appears to be a clear intent in certain hostile Third World countries, to possess long-range ballistic missile delivered weapons of mass destruction as a consequence of lessons learned from regional conflicts involving conventional forces of the United States. Operation Desert Storm might have unfolded quite differently had Saddam Hussein had the capability to hold the U.S. homeland at risk.

Figure U-4 presents the current and emerging threats of WMD from former Soviet Union countries, China, and Third World countries.

The Nation is Vulnerable to Current and Emerging Threats



SUCCESSFUL ATTACK UNACCEPTABLE !

Countries with capability to attack USA	China	Russia	Ukraine*	Kazakhstan*	Belarus*
#	Few	Many	Many	Many	Few

Hostile countries with some missile capability and ICBM ambitions	Iran	Iraq	Libya	North Korea	Syria	Potential for Others
	✓	✓	✓	✓	✓	

* Initiatives underway to move weapons to Russia
✓ Also have nuclear programs

Figure U-4

Figure U-5 shows current missile capabilities of hostile countries, plus estimates of how long it will take these countries to achieve nuclear weapon capability. Note the dramatic rate at which one hostile power, North Korea, has progressively achieved increased range in its missiles. This is a trend that will rapidly threaten the Asian hemisphere.

PATRIOT was recently sent to South Korea to offer some deterrent to the potential use of the shorter range TBM against South Korea. The longer range TBMs, Nodong 1 and 2, are clearly being developed with the objective of influencing activities far removed from the Korean peninsula. Third World countries could achieve ICBM capability in the next decade.

Emerging Threats of Hostile Nations

	Ballistic Missile Range (km)	Years to Nuclear Warheads
Iran	480	6-7
Iraq	306	1-5
Libya	306	5-10
N. Korea	1000	0-5
Syria	480	5-10

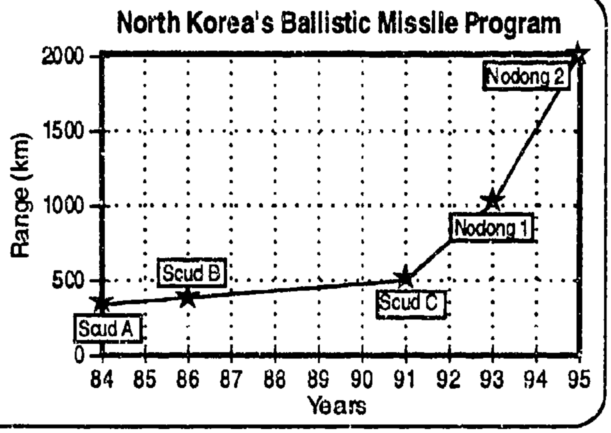


Figure U-5

Ballistic missiles require relatively low technology and are relatively low in cost. They are difficult to destroy because they can be obtained and launched covertly. Also, they have long ranges and relatively short flight times compared to other delivery means. Further, they can be somewhat nondeterrable since a preemptive strike may be politically unfeasible.

History shows a continuous move toward acquisition of missiles, growth in their range, and increase in their use. The general growth in trade and availability of technology has made it easier for all countries to obtain sufficient technology to develop long range missiles. History shows a willingness to use such missiles, and their growth and modernization which represents a rapidly emerging threat (Figure U-6).

History of Ballistic Missile Development and Use

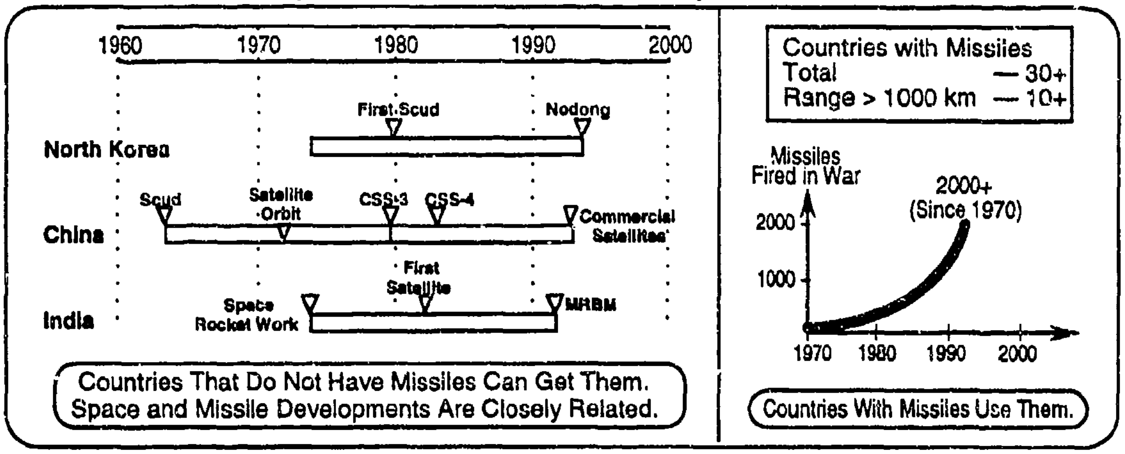


Figure U-6

Available technology could permit rapid development of intercontinental ballistic missiles. The technology is available from nations with space programs or those which now have ballistic missile capabilities. Adequate intercontinental guidance can be obtained by using readily available inertial units typical of aircraft navigation systems with updates from a Global Positioning System (GPS) receiver. Figure U-7 shows a theoretical accuracy that could be achieved using these techniques.

Technology for ICBMs is Available

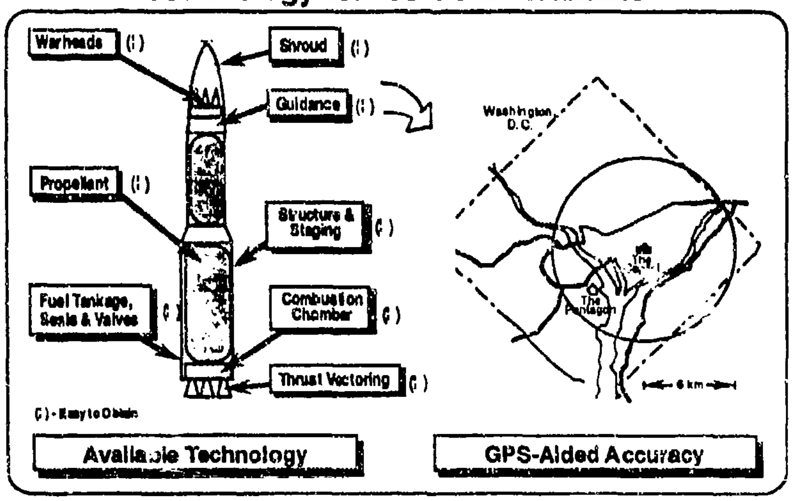


Figure U-7

NMD SYSTEM

With the availability of ICBMs and ICBM technology, plus the stated intent to employ such weapons of mass destruction against the U.S., it is in our interest (and an objective of our national strategy) to develop a National Missile Defense System. The operational goal of the NMD System is to provide a near leak-proof defense against a

limited number of long-range ballistic missile re-entry vehicles which contain conventional, nuclear, biological, or chemical warheads.

The longest portion of a ballistic missile's trajectory is the midcourse phase of flight above the earth's atmosphere. To mitigate effects on the ground and to provide the required level of protection, the warfighting concept is to engage the hostile targets at the maximum range and altitude possible, thereby maximizing the available battlespace, the area protected, and the confidence of negating all targets.

The BMDO objective NMD System architecture includes Ground-Based Exoatmospheric Interceptors (GBI); a ground-based National Defense Radar (NDR); a Battle Management, Command, Control, and Communications (BM/C3) capability; and a constellation of Surveillance and Missile Tracking Satellites (SMTS). Based upon an emergency deployment decision at any time, the U.S. Army will acquire, field, and operate the ground-based NMD Battalion consisting of interceptors, radars, and BM/C3 that will operate with the rest of the NMD System.

An operational NMD System will be engaged by the Commander-in-Chief, U.S. Space Command (CINCSPACE) based upon launch warning and confirmation from the existing Integrated Tactical Warning and Attack Assessment (ITW/AA) system of early warning satellites and radars. The Command-level BM/C3 will receive ITW/AA and/or SMTS data and plan the overall mission for CINCSPACE authorization. Upon authorization, the battalion-level BM/C3 will plan engagements to ensure mission accomplishment. The sequence of warfighting events will include:

- Tasking the sensors for object location and identification data to support interceptor launches and/or target updates;
- Launching interceptors toward the threat object complex utilizing the Battalion BM/C3 and updated sensor data;
- Providing sensor updates to the interceptors during flight to allow the exoatmospheric kill vehicle to acquire, track, select, home-on, and intercept the ballistic missile re-entry vehicle; and,
- Conducting hit assessment and re-planning additional interceptor launches as necessary until all lethal threat objects are destroyed.

The NMD Program is a streamlined system-focused, advanced development effort. The program objective is to develop and test a limited system capability as rapidly as available funding will permit, then conduct robust emergency acquisition and deployment planning. Accomplishing the program objective will reduce the lead time needed to deploy an effective capability should a threat to the U.S. arise sooner than currently forecast.

Based on existing technologies plus leverages of the substantial investment in Theater Missile Defense systems, the Army is fabricating NMD hardware called the Exoatmospheric Kill Vehicle (EKV), the Radar Technology Demonstrator (RTD), and the Battalion BM/C3. This prototypical hardware will be used over the next three to five years to demonstrate--incrementally via progressive simulation ground testing, and realistic flight testing--the potential effectiveness of an integrated NMD System against the most likely threat.

Achieving the initial fabrication and test program objectives will ensure the availability of proven, flight-qualified hardware designs for future acquisition and emergency deployment when needed. The hardware designs will be modular and flexible, allowing future enhancements to respond to increases in threat sophistication over time. The emergency acquisition and deployment planning will ensure the users are trained and the hardware is supportable. This focused program will result in increased confidence in system performance as well as reduced lead time for deployment.

The focused deployment program provides integrated tests of combinations of the maturing elements of the NMD. These would be assembled into a User Operational Evaluation System (UOES) configuration, acquired, and deployed, if a threat emerged. A UOES would be achieved by acquisition and deployment of sufficient numbers of developmental hardware and software items to provide a limited capability. This would constitute some defense capability while operational testing continues.

Options. A number of combinations of subsystems that could be combined and deployed as a UOES for defense of the U.S. have been studied. These options begin with the simplest (and least capable) and proceed to the objective NMD System. Some of the options studied are listed on Figure U-8.

OPTION	SUBSYSTEMS	CAPABILITY
1	A few interceptors (EKV on PLV), the upgraded EWR, the NDR and a BM/C3.	Kill a few medium to large RVs with simple PENAIDS.
2	A few interceptors (EKV with an adjunct sensor package on PLV), the upgraded EWR, the NDR, and the BM/C3.	Kill a few small to large RVs with reasonably sophisticated PENAIDS.
3	Up to 100 GBIs, the upgraded EWR, the NDR, SMTS, and BM/C3 (objective system). All of the BM/C3 are interfaced with the national command command structure.	Kill 10s of RVs with sophisticated PENAIDS.

Figure U-8

Figure U-9 presents an Option 1 deployment, and lists the concept of operation and the development being undertaken. The coverage of that option against typical Third World threats is presented in Figure U-10.

Option 1

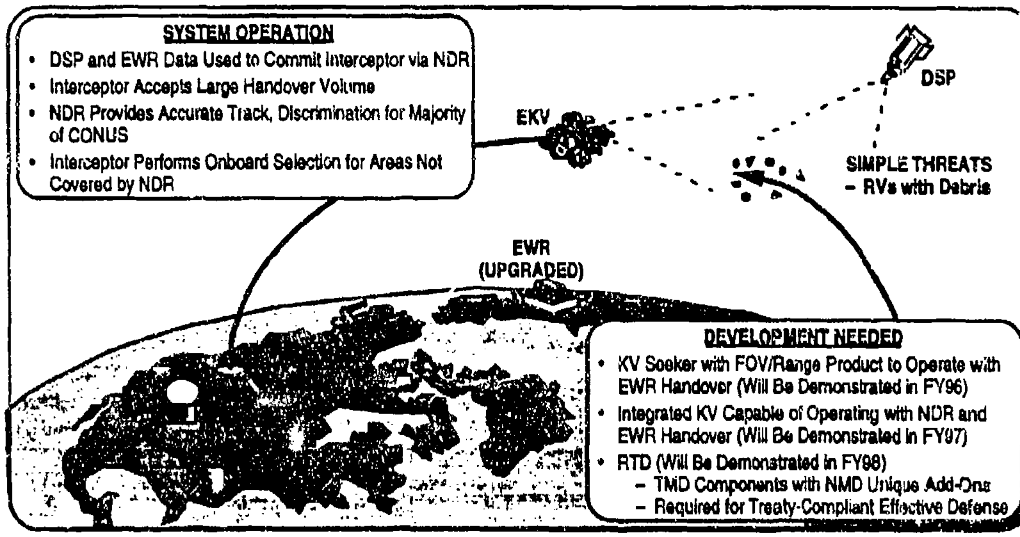


Figure U-9

Option 1 CONUS Coverage of Third World Threats

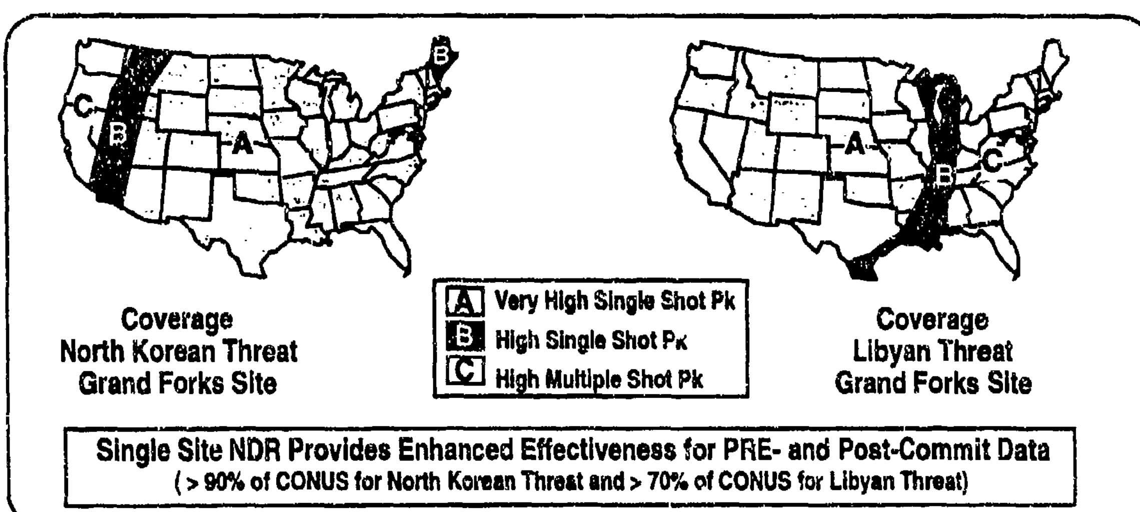


Figure U-10

SECTION 3

CURRENT PROGRAM ASSESSMENT

"Revenge takes forty years; if not my son, then the son of my son will kill you. Someday we will have missiles that can reach New York."
-Abdul Abbas
PLF Leader

The Army NMD program capabilities are assessed in terms of criteria:

RED -- No capability exists, or is insufficient to defeat the threat or provide the required support;

AMBER -- A limited capability or quantity exists to perform the mission; and,

GREEN -- Adequate capability and quantity exists to perform the mission.

The assessments also consider capabilities as they apply to time: near-term--FY 95-96; mid-term--FY 97-00; and, far-term--FY 01-09.

The Army assesses NMD capabilities **RED** in the near- and mid-terms, and **AMBER** in the far-term. The near- and mid-term assessments are **RED** since the current Future Years Defense Program (FYDP) provides funding for the development and test program only. The OSD Bottom-Up Review in 1993 resulted in the NMD Program being transitioned from an acquisition program to a technology readiness program without a commitment for acquisition and deployment within the FYDP years. Therefore, there is no funding to acquire, field, and operate a NMD System in the FYDP. However, with adequate funding for acquisition, test, deployment and support, a limited system capability (**AMBER**), against simple threats, could be achieved in the mid-term.

The far-term assessment is **AMBER** since BMDO is currently planning to acquire and deploy a limited, treaty-compliant NMD System in FYs 06-10. A limited capability for performing the mission is assessed **AMBER** in the far-term because the threat beyond FY 10 is very uncertain. To maintain the **AMBER** rating against more stressing threats will require additional funds for a robust technology program in the near- and mid-terms.

The FY 95 Defense Authorization Act and current OSD guidance indicate that we need to be prepared to acquire, field, and operate a limited, prototypical NMD System on very short notice, if a quantitatively-limited, long-range ballistic missile threat to the U.S. appears sooner than forecast. Further, the FY 95 Defense Authorization Act establishes the objective of the NMD Program: "to develop and test, as rapidly as available NMD funding will permit, a limited, 'UOES-type' (User Operational Evaluation System) capability using existing flight-qualified hardware, even though such hardware

may not incorporate the latest "state of the art" technology. Assuming this program (described in Section 4) is accomplished in consonance with this guidance--sufficiently early, reliable threat warning is received, and additional funds are made available--the Army could deploy a limited capability in the mid-term. This limited prototypical capability would be rated **AMBER.**

In order to maintain the option to deploy throughout the development process, emphasis is being placed on integrated testing and the capability to make that set of hardware and software available as a UOES. In addition to the development and test program, production, deployment, and training plans are being refined.

Production will be accomplished at R&D facilities since the low number of interceptors (a hundred or so), radars (one or a few), and command centers (one or a few) does not warrant a "production line." There will be "production lines"; however, for some components of NMD, for example, the solid state Transmit/Receive (T/R) modules of the radar. In this case, the production line was developed for TMD and will be used to populate the larger antenna for the RTD, and if built, the NDR. The contractors will utilize industry standards and practices to the maximum extent to reduce system cost.

The early deployment site is likely to be Grand Forks, North Dakota, since this site was approved during earlier ABM treaty negotiations as a BMD site. However, there has been limited contingency planning for other single sites in order to improve effectiveness in the event the "threat" is from, for example, North Korea or Libya.

The plan to support deployment (training, spares, etc.) rests with the development contractor. Emergency acquisition and deployment planning will require special emphasis on site development, communications, physical security, and force structure to ensure smooth transition to a deployed status.

SECTION 4

RESEARCH, DEVELOPMENT, AND ACQUISITION

"...changes in military technology are culminating in what many believe will be a 'military-technical revolution' that brings unprecedented depth and transparency to the battlefield."
GEN Gordon R. Sullivan
Army, Chief of Staff

NMD Research, Development, and Acquisition (RDA) Strategy. The RDA strategy for the Army's part of National Missile Defense (NMD) is to develop and incrementally test the interceptor, radar, and associated BM/C3 as rapidly as funding will permit. The program allows for rapid deployment, at any time in the development process, of the best available system. The decision to accelerate development and eventual deployment will be based upon the recognition of a viable threat.

Concurrent with these developments, NMD contingency deployment and facility planning will include special studies to define training and supportability concepts, facility types, improvements to existing facilities, locations, environmental considerations, sizes, survivability, special equipment, and recovery and reconstitution needs.

A brief description of the current Army NMD subsystems under development--EKV, RTD, and BBD--is presented in the following paragraphs.

NMD SUBSYSTEMS

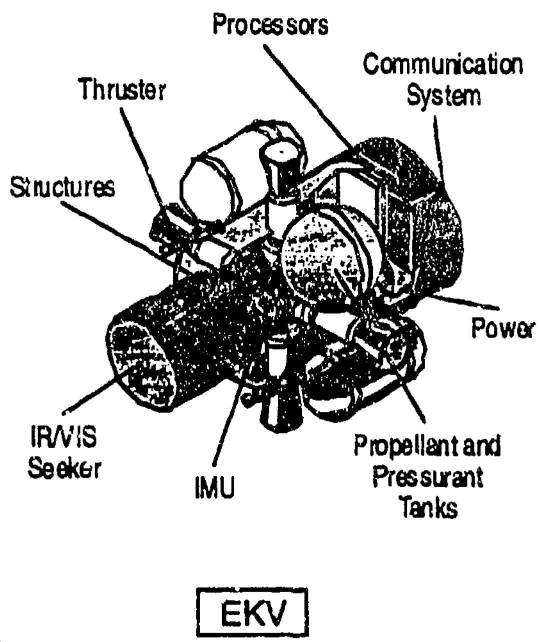
Exoatmospheric Kill Vehicle (EKV)

The EKV is the smart, non-nuclear, hit-to-kill payload portion of the GBI element of the NMD system. The EKV contains an on-board optical seeker, data processing, guidance, and divert propulsion capabilities required to intercept long-range ballistic missile re-entry vehicles in the midcourse portion of their flight trajectory. Target destruction is accomplished by the transfer of kinetic energy caused by the impact of the EKV and target (hit-to-kill). The EKV with the Payload Launch Vehicle (PLV) is shown in Figure U-11. The PLV is an existing modified Minuteman second and third stage booster stack.

The Army is planning to perform the EKV flight test at the U.S. Army Kwajalein Atoll (USAKA). The EKV development effort hinges on integrating existing kill vehicle component technologies developed under previous BMDO programs. The focus of the EKV effort will be to demonstrate the on-board seeker's long-range target acquisition, tracking, and target selection capability to enable operations with a wide variety of pre-commit sensor systems.

The EKV test hardware is traceable to the deployable configuration of the GBI kill vehicle. The EKV test hardware will be used over the next three to five years to incrementally demonstrate the potential effectiveness of an integrated NMD system against the most likely threat, through progressive simulation, ground testing, and realistic flight testing.

Exoatmospheric Kill Vehicle



- WEAPON ELEMENT FOR NMD
- HIT-TO-KILL NON-NUCLEAR EXO INTERCEPTOR OF STRATEGIC REENTRY VEHICLES
- DORMANT, FIXED-SITE TREATY COMPLIANT INTERCEPTOR
- USES MATURE TECHNOLOGY IN CURRENT EKV DESIGN

Figure U-11

Successful accomplishment of the initial fabrication and test program will ensure the availability of proven, flight-qualified hardware designs for future acquisition and emergency deployment when needed. The test hardware designs will be modular and flexible to allow future enhancements to respond to increases in threat sophistication over time.

Radar Technology Demonstrator (RTD)

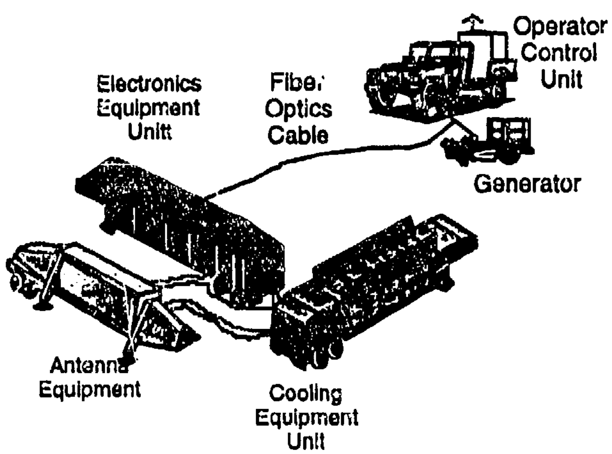
The RTD is the scaled-down, test hardware configuration of the NDR element of the NMD system. The RTD is a wide bandwidth, solid-state X-Band phased array radar. The RTD is capable of long-range detection, acquisition, tracking, and classifying of ballistic missile threat objects in the midcourse portion of their flight trajectory to enable intercept. Figure U-12 shows the relationship between the DEM/VAL version of TMD Ground Based Radar (GBR) and the RTD to be built, tested, and integrated at USAKA.

The Army is executing RTD integrated testing with the EKV at the USAKA. The RTD development leverages the substantial investment in the Theater Missile Defense Ground Based Radar (TMD-GBR) Development Program. The reconfiguration of the TMD-GBR into the RTD will involve the design and fabrication of a larger radar antenna aperture that has more transmit/receive modules. The effects will be to increase the range capability, the development of NMD unique software algorithms, and the TMD-GBR electronic, cooling, and power units. The focus of the RTD effort will be to demonstrate the unique NMD radar functions allowing high-confidence intercept at closing velocities twice those of TMD engagements. The RTD test hardware will be used over the next three to five years to incrementally demonstrate the potential effectiveness of an integrated NMD System against the most likely threat, through progressive simulation, ground testing, and realistic flight testing.

NMD RTD Assembled From DEM/VAL

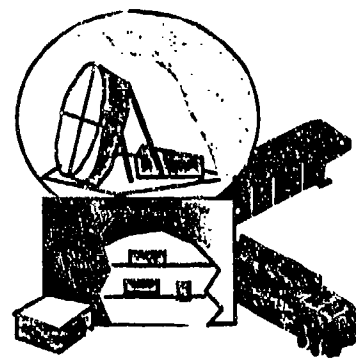
TMD GBR Components

DEM/VAL TMD GBR



- DEM/VAL TMD GBR COMPONENTS (GFP)
  - Receiver / Exciter
  - Data Processing Equipment
  - Displays and Control Equipment
  - Signal Processing Equipment
  - EEU, CEU, OCU Shelters
  - 12,500 T/R Modules

RADAR TECHNOLOGY DEMONSTRATOR (RTD)
(Located at KMR)



- SOLID STATE LFOV ARRAY
  - 25,344 T/R Modules
- 2000 km RANGE ON STRATEGIC RVs
  - 3000 km Range via Coherent Integration
- NMD GBR SOFTWARE AND ALGORITHMS
- TILTABLE / TRAINABLE MOUNT
- COLLECTS DATA AND VALIDATES NDR TECHNOLOGIES
- SUPPORTS INTEGRATED SYSTEM TESTS

Figure U-12

The relationship among the various radars - TMD, RTD, and the NMD objective radar, sometimes termed the NDR, is presented in Figure U-13.

Radar Comparison

	TMD DEM/VAL	RTD	NDR
RF Technology	GaAs SS T/Rs	GaAs SS T/Rs	GaAs SS T/Rs
Aperture	4.6 m^2	81.3 m^2	102 m^2
T/R Modules	12672	25344	67584
Peak Radiated Power	X	2X	11X
Cued Detection Range	425 km	3000 km	5100 km
Electronic Field-of-View (Circular)	±53°	±17.5°	±26°
Prime Power	0.75 MW	1 MW	2 MW

Figure U-13

Battalion BM/C3 Demonstrator (BBD)

The BBD is the test configuration of the Battalion BM/C3 portion of the NMD System. The BBD provides the capability to test the BM/C3 functions that help human operators control and use the ground based NMD Battalion interceptors and radars. The BBD consists of the computer and communications hardware and software components that assist the operators at the launch and radar site perform engagement planning, decision-making, and connectivity with the rest of the NMD system. The BBD is complementary to and will interoperate with the Command-level BM/C3 being developed by the Air Force because the BBD aids human operators to perform mission planning, decision-making, and connectivity to the Battalion site.

Figure U-14 shows the links of the BBD to the subsystems and communication of the NMD System.

NMD BM/C3System

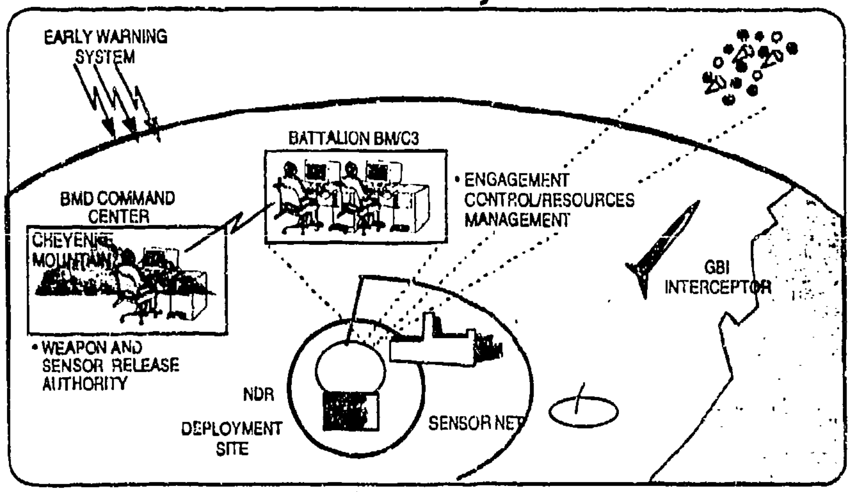


Figure U-14

The Army is executing BBD integrated testing with the EKV at the USAKA. The BBD development leverages the substantial investment in the Theater High Altitude Area Defense (THAAD) Development Program and common hardware and software. The BBD effort is developing NMD unique software algorithms for implementation on off-the-shelf computer hardware. The focus of the BBD effort is to demonstrate the unique NMD Battalion BM/C3 functions for managing and controlling the Battalion interceptors and radar to plan high confidence intercepts based upon various threat scenarios. The BBD test configuration is scheduled for use over the next three to five years to incrementally demonstrate the potential effectiveness of an integrated NMD System against the most likely threat through progressive simulation, ground testing, and realistic flight testing.

The SMTS, formerly known as Brilliant Eyes, is an Air Force managed program consisting of a constellation of space-based satellites. Each has a suite of short wavelength infrared, medium wavelength infrared, long wavelength infrared, and visible sensors designed to provide global tracking and discrimination of ballistic missiles in their boost, post-boost, and midcourse phases.

SECTION 5

TRAINING

"...Warriors win wars, and smart weapons require smart people and
sound doctrine to maximize their effectiveness"
Conduct of the Persian Gulf,
Final Report to Congress, DoD
Apri 992

The NMD System is a t. a''y U.S. based, fixed site operation that presents a vastly different approach . training tha. any other Army Mission area. Execution of the NMD Mission requires a . g. s'a' . readiness, around-the-clock, in order to accomplish the NMD mission wi. . th extremely short timelines associated with defending the U.S. against a limited ballistic missile attack. Due to these short timelines, the actual execution of the NMD Battle Plan will be a highly automated process with human oversight and control

The NMD Training Strategy focuses on the overriding principle that the battle center commander and his staff must make the correct tactical decisions with automated support in seconds. This differs from normal battle operations where decisions can be made over days and hours given unfolding intelligence. The focus is on training the operator to make the best use of integrated data to fight the battle.

The Army NMD training concept will embrace the systems approach to training decision-makers, operators, and maintainers manning the NMD system. NMD training will encompass the entire force envisioned for the NMD system including Active Component, Army National Guard, Department of the Army civilians, and contractor personnel.

Training for all NMD support personnel will be performed by element specific contractors responsible for developing New Equipment Training Plans and System Training Plans IAW Army Regulation 350-35 Army Modernization Training. Due to the low density of NMD system elements, maintenance and maintenance training will be conducted by the prime contractors with government oversight.

The low density, force structure, and siting of the NMD system will require a change to the traditional TRADOC training concept of institutional replacement training. Contractors will develop and deliver an exportable training package for sustainment and replacement training; training of NMD Operations and C3I personnel will occur on-site. Nonpeculiar NMD skills will be taught by traditional TRADOC institutions.

Due to the highly automated NMD system, maximum emphasis will be placed on embedded and computer-assisted simulation training. Training equipment will therefore consist of actual configuration items and will be focused on the command and control center (Figure U-15). Army NMD Operations Center personnel will train as a unit, and

will participate in command exercises under the control of USCINCSPACE and CINCNORAD. This process will provide the capability to conduct realistic NMD training during peacetime. In turn, this will result in the expertise and a high state of readiness necessary to conduct crisis and wartime missions.

Army NMD Battalion BM/C3 Center

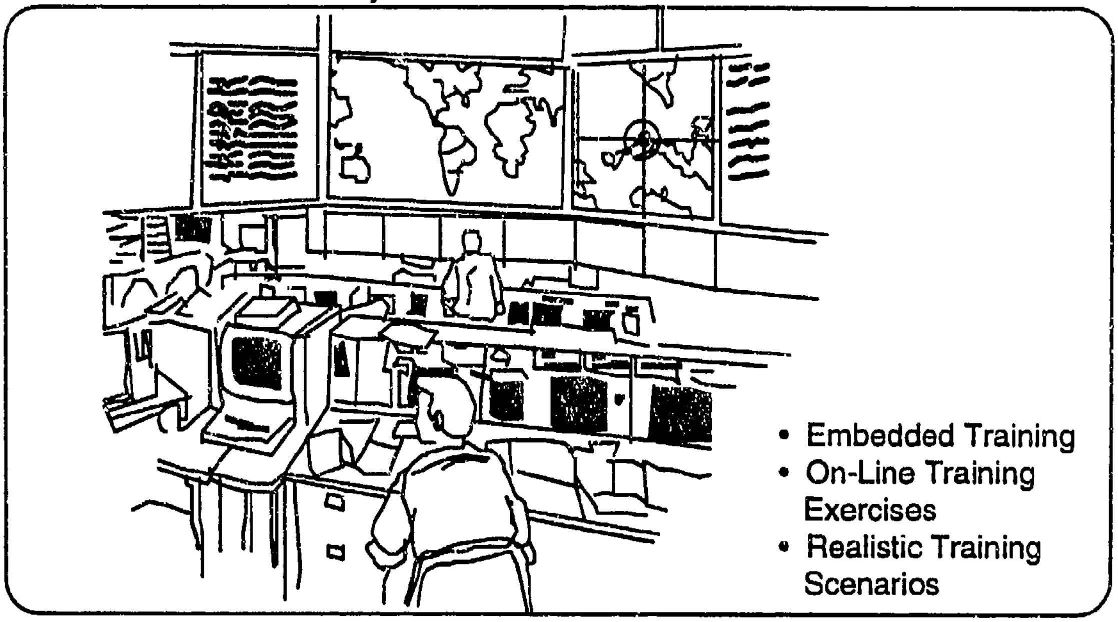


Figure U-15

SECTION 6

CONCLUSION

"....The world is still a very dangerous place, and there are both existing and emerging dangers toward which we must remain vigilant."
GEN Colin Powell

Currently, the U.S. is not protected against a strategic ballistic missile attack. This puts at risk our population, our home based military forces, and our industrial and financial institutions--all of which contribute significantly to our position of leadership in the world. In addition, this lack of protection makes the U.S. susceptible to "nuclear blackmail," reducing our flexibility to act decisively; to project military power; and to protect the national interests of the U.S. and our allies.

The NMD Program is unique to the Army Modernization Plan. It intends, within limited funding, to establish a contingent strategic defense capability as rapidly as possible through development, integrated testing, and across the board contingency deployment planning. In this multi-service program, the Army has the lead in developing and testing BMDO funded representative NMD interceptor, radar, and Battalion BM/C3 hardware and software.

NMD is currently assessed **RED** because no capability exists to intercept and destroy a re-entry vehicle (carrying a weapon of mass destruction) from an ICBM or Long-Range SLBM. The NMD system will become **AMBER** when the hardware and software are flight-proven and deployed at the NMD deployment site. With adequate funding, the Army and BMDO can provide flight-qualified hardware/software to support a contingency deployment decision with subsequent site activation and deployment.

National Missile Defense, when deployed, will protect the American homeland--our people, our U.S.-based military forces, and our private institutions--against a quantitatively limited, long-range ballistic missile attack. Therefore, NMD will provide the necessary military capability to allow the National Command Authority to credibly deter and defeat aggression by projecting and sustaining U.S. power when needed. Furthermore, NMD is a deterrent to nations seeking to establish strategic ballistic missile capabilities because NMD provides an Antiballistic Missile Defense (ABM) Treaty which is a compliant solution to the potential use of such weapons.

1995 Army Modernization Plan
Glossary

A2C2	Army Airspace Command and Control
A2C2S	Army Airborne Command and Control System
AAE	Army Acquisition Executive
AALC	Advanced Airdrop for Land Combat
AAFARS	Advanced Aviation Forward Area Refueling System
AAO	Army Acquisition Objective
AAPART	Annual Proficiency and Readiness Test
ABCS	Army Battle Command System
ABE	Advanced Boresight Equipment
ABM	Anti-Ballistic Missile
ABMOC	Air Battle Management Operation Center
ABN	Airborne
ABT	Air Breathing Threat
AC	Active Component
ACADA	Automatic Chemical Agent Detector Alarm
ACOE	Army Common Operating Environment
ACPM	Aircrew Protective Mask
ACR	Armored Calvary Regiment
ACS	Aerial Common Sensor
ACT	Advanced Cargo Transport
ACT	Apache Crew Trainer
ACTD	Advanced Concepts Technology Demonstrations
ACTS	Advanced Communications Technology Satellite
ACUS	Area Common User Communication System
ADA	Air Defense Artillery
ADCATT	Air Defense Combined Arms Tactical Trainer
ADCPE	Advanced Deployable Collective Protection Equipment
ADDS	Army Data Distribution System
ADO	Army Digitization Office
ADSS	ANVIS Display Symbology System
ADTOC	Air Defense Tactical Operations Center
AED	Advanced Expendable Dispenser
AEI	Armament Enhancement Initiative
AEOCM	Advanced EO Countermeasures
AFAS/FARV	Advanced Field Artillery System/Future Armored Resupply Vehicle
AFATDS	Advanced Field Artillery Tactical Distribution System
AGCCS	Army Global Command and Control System
AGES	Air Ground Engagement System
AGP	Army Gateway Program
AGPU	Aviation Ground Power Unit
AGS	Armored Gun System

AGSE	Aviation Ground Support Equipment
AGTS	Advanced Gunnery Training System
AH-64D	Attack Helicopter
AHP	Advanced Helicopter Pilotage
AI	Artificial Intelligence
AICPS	Advanced Integrated Collective Protection
AIE	Aircrew Integrated Ensemble
AIT	Automatic Information System
ALSE	Aviation Life Support Equipment
AMC	Army Materiel Command
AMDC4	Advanced Medical Diagnostic Communications for Combat Casualty Care
AMEC	Army Management Engineering College
AMEDD	Army Medical Department
AMIDS	Aircraft Maintenance Intermediate Diagnostics System
AMP	Army Modernization Plan
AMPS	Aviation Mission Planning System
ANBACIS	Automated Nuclear, Biological and Chemical Information
ANG	Army National Guard
ANSO	Army Driver Standardization Office
ANVIS	Aviator's Night Vision Imaging System
AO	Area of Operations
APFSDS-T	Armor Piercing Fin Stabilized Discarding Sabot Tracer
APOBS	Anti-Personnel Obstacle Breaching System
APOD	Airport of Debarkation
AQF	Advanced QUICKFIX
ARES	Army Executives For Software
ARF	Airborne Relay Facility
ARH	Anti-Radiation Homing
ARI	Aviation Restructure Initiative
ARL	Airborne Reconnaissance-Low
ARSOF	Army Special Operations Forces
ARM	Anti-Radiation Missile
ARNG	Army National Guard
ARPA	Advanced Research Projects Agency
ARSOF	Army Special Operations Forces
ART	Advanced Rotorcraft Transmission
ARTEP	Army Training Evaluation Program
ASARS	Advanced Synthetic Aperture Radar System
ASAS	All Source Analysis System
ASAT	Anti-Satellite
ASE	Aircraft Survivability Equipment
ASEDP	Army Space Exploitation Demonstration Program
ASET	Aircraft Survivability Equipment Trainer
ASMP	Army Strategic Mobility Program
ASPO	Army Space Programs Office

ASRT	Autonomous Scout Rotorcraft Technology
ASSLT	Air Assault
ASST	Advanced Submunition Sensor Technology
ASTAMIDS	Airborne Standoff Minefield Detection System
ASTMP	Army Science and Technology Master Plan
ASTRO	Army Space Technology and Research Office
ATA	Air-to-Air
ATACMS	Army Tactical Missile System
ATAM	Air-to-Air Missile
ATAS	Air-to-Air STINGER; Advanced Tank Armament System
ATC	Air Traffic Control
ATCAS	Advanced Towed Cannon System
ATCCS	Army Tactical Command and Control System
ATD	Advanced Technology Demonstration
ATGM	Anti-Tank Guided Missile
ATGM	Air-to-Ground Missile
ATHS	Airborne Target Handover System
ATIMP	Army Training Information Management Program
ATIRCM	Advanced Threat IR Countermeasures
ATLAS	All-Terrain Lifter Articulated System
ATM	Anti-Tactical Missile
ATM	Asynchronous Transfer Mode
ATMD	Advanced Threat Missile Detector
ATNAVICS	Air Traffic Navigation, Integration, and Coordination System
ATP	Allied Technical Publication
ATR	Aided Target Recognition
ATRJ	Advanced Threat Radar Jammer
ATS	Air Traffic Services
ATXXI	Army Training 21st Century
AVA	Aviation Vibration Analyzer
AVCATT	Aviation Combined Arms Tactical Trainer
AVIM	Aviation Intermediate Maintenance
AVOAC	Aviation Officer's Advanced Course
AVTB	Aviation Test Bed
AVTOC	Aviation Tactical Operations Center
AWACS	Airborne Warning and Control System
AWD	Advanced Warfighting Demonstration
AWE	Advanced Warfighting Experiment
AWMP	Army Watercraft Master Plan
AWSS	Area Weapon Scoring System
BADS	Biological Agent Decontamination System
BAI	Battlefield Air Interdiction
BAS	Biological Agent Simulant
BAT	Brilliant Anti-Armor Technology
BBD	Battalion BM/C^3 Demonstrator

BBS	Brigade and Battalion Simulation
BCIS	Battlefield Combat Identification System
BCTP	Battle Command Training Program
BDATS	Biological Detection and Alarm Training System
BDE	Brigade
BDM	Bunker Defeating Munition
BDS-D	Battlefield Distributed Simulation Developmental
BE	Brilliant Eyes (now SMTS)
BFA	Battlefield Functional Area
BIDS	Biological Integrated Detection System
BIDSS	Biological Integrated System Simulator
BIPS	Battlefield Imaging Projectile System
BITE	Built in Test Equipment
BLRSI	Battle Lab Reconfigurable Simulator Initiative
BLWE	Battle Laboratory Warfighting Experiment
BM/C3	Battle Management/Command, Control and Communications
BM/C3I	Battle Management/Command, Control, Communications, and Intelligence
BM/C4	Battle Management/Command, Control, Communications, Computers, and Intelligence
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BN	Battalion
BOS	Battlefield Operating System
BRAC	Base Realignment and Closure
BRM	Bridge and Road Munition
BRWL	Bistatic Radar for Weapons Location
BSFV	Bradley STINGER Fighting Vehicle
BSM	Battlefield Spectrum management
BST	Basic Skills Training
BUR	Bottom-Up Review
BW	Biological Warfare or Biological Weapon(s)
C/B	Chemical/Biological
C2	Command and Control
C2V	Command and Control Vehicle
C3	Command, Control and Communications
C3I	Command, Control, Communication, and Intelligence
C4	Command, Control, Communications and Computers
C4I	Command, Control, Communications, Computers, and Intelligence
C4IFTW	Command, Control, Communications, Computers and Intelligence For The Warrior
CA	Civil Affairs
CAAD	Corps Area Air Defense
CAADCI	Common Air Defense Communications Interface

CAAMS	Computer Assisted Artillery Meteorological System
CABS	Crashworthy Air Bag System
CAC	Combined Arms Center
CADS	Chemical Agent Detecting Solution
CAI	Computer Assisted Instruction
CAI	Combined Arms Initiative
CAI	Computer Assisted Instruction
CALFEX	Combined Arms Live Fire Exercise
CALL	Center for Army Lessons Learned
CAM	Chemical Agent Monitor
CAM	Commercial Assets Mobilization
CAS	Close Air Support
CASCOM	Combined Arms Support Command
CATS	Combined Arms Training Strategy
CATT	Combined Arms Tactical Trainer
CAV	Composite Armored Vehicle
CBADS	Chemical/Biological Agent Delivery System
CBD	Chemical/Biological Defense
CBDCOM	Chemical and Biological Defense Command
CBS	Corps Battle Simulation
CBW	Chemical/Biological Warfare
CCF	CONUS Contingency Force
CCO	Close Combat Optic
CCTT	Close Combat Tactical Trainer
CD	Civil Defense
CDA	Cognitive Decision Aiding
CDATS	Chemical Detection and Alarm Training System
CDI	Classification, Discrimination, and Identification
CDRs	Commanders
CECOM	Communications Electronics Command
CENTCOM	Central Command
CEU	Cooling Equipment Unit
CFF	Central Funding and Fielding
CFT	Captive Flight Trainers
CGI	Computer Generated Imagery
CGS	Common Ground Station (JSTARS GSM Block II)
CH	Cargo Helicopter
CHALS-X	Communications High Accuracy Location System Exploitable
CHEMSIM	Chemical Simulation
CHI	Coastal, Harbor and Inland Waterway Boat
CHS	Common Hardware and Software
CHSS	Combat Health Support System
CIMPMD	Close-In Portable Minefield Detection System
CINC	Commander in Chief (of a unified or specified command)
CINCNORAD	Commander-in-Chief North American Defense Command

CINCSPACE	Commander-in-Chief U.S. Space Command
CITV	Commander's Independent Thermal Viewer
CLU	Command Launch Unit
CLW TLD	21st Century Land Warrior Top Level Demonstration
CM	Cruise Missile
CMI	Computer Managed Instruction
CMS	Combat Mission Simulator
CMST	Collection Management Support Tools
CNR	Combat Net Radio
COMINT	Communications Intelligence
COMPUSEC	Computer Security, Computers, and Intelligence Computer Infrastructure
COMSEC	Communications Security
CONUS	Continental United States
CORPS SAM	Corps Surface-to-Air Missile
COTS	Commercial-Off-The-Shelf
CP	Collective Protection
CPE	Collective Protection Equipment
CPU	Central Processing Unit
CPX	Command Post Exercise
CR-UAV	Close Range-Unmanned Aerial Vehicle
CS	Combat Support
CSA	CINC Support Aircraft
CSAB	Combat Support Aviation Battalion
CSGTS	Commander's Second Generation Tank Sight
CSMET	Crew Station Mission Equipment Trainer
CSS	Combat Service Support
CSSCCS	Combat Service Support Command and Control System
CT	Counter Terrorism
CTC	Combat Training Center
CTIS	Combat Terrain Information Systems
CTT	Commander's Tactical Terminal
CTT-H	Commanders Tactical Terminal-Hybrid
CUCV	Commercial Utility Cargo Vehicle
CUITN	Common User Installation Transfer Network
CVDOS	Combat Vehicle Defensive Obscuration System
CW	Chemical Warfare or Chemical Weapon(s)
CWC	Chemical Weapons Convention
D/NAPS	Day/Night Adverse Weather Pilotage System
DA	Department of the Army
DAC	Department of the Army Civilians
DAM	Decontamination Agent, Multi-purpose
DAMA	Demand Assigned Multiple Access
DAMPL	Department of the Army Master Priority List
DCSLOG	Deputy Chief of Staff for Logistics

DCSOPS	Deputy Chief of Staff for Operations
DDN	Defense Data Network
DEM/VAL	Demonstration Validation
DEPEX	Deployment Exercise
DEPMEDS	Deployable Medical Systems
DF	Direction Finding
DFLP	Defense Foreign Language Program
DIS	Distributed Interactive Simulation
DISC4	Director of Information Systems Command, Control, Communications and Computers
DISN	Defense Information Systems Network
DLEA	Drug Law Enforcement Program
DMFCS	Digitized Mortar Fire Control System
DMS	Defense Message System
DMSP	Defense Meteorological Satellite Program
DoD	Department of Defense
DOTLMS	Doctrine, Organization, Training, Leadership, Materiel, and Soldiers
DPG	Defense Planning Guidance
DS-2	Decontamination Solution #2
DS/GS	Direct Support/ General Support
DSCS	Defense Satellite Communications System
DSP	Defense Satellite Program
DST	Driver Skill Trainers
DTD	Digital Topographic Data
DTP	Distributed Training Packages
DTS	Data Transfer System
DTSS	Digital Topographic Support System
DTV	Driver's Thermal Viewer
DUECE	Deployable Universal Combat Earthmover
E-O	Electro-Optic
E-UAV	Endurance-Unmanned Aerial Vehicle
E/O	Electro-Optical (also EO)
EA	Electronic Attack
EAC	Echelons Above Corps
EADSIM	Extended Air Defense Simulation
EADTB	Extended Air Defense Test Bed
ECBRS	Enhanced Concept Based Requirements System
ECIT	Enhanced Communication Interface Terminal
ECM	Electronic Countermeasures
ECU	Environmental Control Unit
ECWSS	Extreme Cold Weather Sleep System
EEU	Electronics Equipment Unit
EFOG-M	Enhanced Fiber Optic Guided Missile
EIP	Enterprise Implementation Plan
EISS	Executive Information Systems Seminar

EKV	Exoatmospheric Kill Vehicle
ELINT	Electronic Intelligence
ELRF	Eyesafe Laser Rangefinder
ELW	Enhanced Land Warrior
EM	Electromagnetic (Spectrum)
EMD	Engineering and Manufacturing Development
EME	Electromagnetic Environment
EMP	Electromagnetic Pulse
EMRO	Electromagnetic Radiation Operation
EMUT	Enhanced Manpack UHF Terminal
ENCATT	Engineer Combined Arms Tactical Trainer
EO	Electro-Optical
EOD	Explosive Ordnance Disposal
EOTADS	Electro-Optical Target Acquisition Designation System
EP	Electronic Protection
EPA	Extended Planning Annex
EPA	Environmental Protection Agency
EPDS	Electronic Processing and Dissemination System
EPLRS	Enhanced Position Location Reporting System
EPP	Extended Planning Period
EPP	Electric Power Plant
ERA	Extended Range Artillery (Projectile)
ERINT	Extended Range Intercept Technology
ESP	Extended Service Program
ESSS	External Stores Support System
ETP	Exportable Training Packages
ETRAC	Enhanced Tactical Radar Correlator
ETUT	Enhanced Tactical Users Terminal
EW	Electronic Warfare
EWR	Early Warning Radar
ExFOR	Exercise Force
EXO	Exoatmospheric
F/I	Flame/Incendiary
FAA	Federal Aviation Administration
FAAD	Forward Area Air Defense
FAADC2	Forward Area Air Defense Command and Control
FAADS	Forward Area Air Defense System
FACE	Forward Aviation Combat Engineering
FAMSIM	Family of Simulations
FARP	Forward Arming and Refueling Point
FAST	Forward Area Support Terminal
FBCB2	Force XXI Battle Command Brigade and Below
FCR	Fire Control Radar
FDA	Food & Drug Administration
FDR	Future Digital Radar
FDR	Future Data Radio

FFAR	Folding Fin Aerial Rocket
FHT	Field Handling Trainer
FID	Foreign Internal Defense
FINL	Flame/Incendiary and Non-Lethal
FIST-V	Fire Support Team Vehicle
FLIR	Forward Looking Infrared
FLO/FLO	Float-On Float Off
FM	Field Manual
FM	Frequency Modulation
FMTV	Family of Medium Tactical Vehicles
FMVSS	Federal Motor Vehicle Safety Standards
FO	Follow-on
FOA	Field Operating Agency
FOC	Full Operational Capability
FOF	Force on Force
FORSCOM	Forces Command
FOV	Family of Vehicles / Field Of View
FP	Force Package
FP1	Force Package 1
FP2	Force Package 2
FP3	Force Package 3
FP4	Force Package 4
FPE	Fighting Position Excavator
FS	Fire Support
FSU	Former Soviet Union
FSV	Future Scout Vehicle
FTS	Full Time Support
FTT	Field Tactical Trainer
FTX	Field Training Exercise
FUE	First Unit Equipped
FW	Fixed Wing
FWIS	Fixed Wing Investment Strategy
FWS	Flight Weapons Simulator
FY	Fiscal Year
FYDP	Fiscal Year Defense Program
GaAs	Gallium Arsenide
GBCS	Ground Based Common Sensor
GBCS-H	Ground Based Common Sensor-Heavy
GBCS-L	Ground Based Common Sensor-Light
GBI	Ground Based Interceptor
GBR	Ground Based Radar
GBS	Ground Based Sensor
GCCS	Global Command and Control System
GEM	Guidance Enhancement Missile
GEN II	Generation II Soldier
GFP	Government Furnished Property

GLPS	Gun Laying and Positioning System
GMF	Ground Mobile Forces
GMFSC	Ground Mobile Forces Satellite Communications
GPADS	Guided Parafoil Air Delivery System
GPALS	Global Protection Against Limited Strike
GPS	Global Positioning System
GRCS	Guardrail Common Sensor
GSAB	General Support Aviation Battalion
GSE	Ground Support Equipment
GSM	JSTARS Ground Station Module (Block I)
GTA	Graphic Training Aids
HAB	Heavy Assault Bridge
HACT	Helicopter Active Control Technology
HAWK	Homing All the Way Killer
HCAA	High Capacity Air Ambulance
HDSB	Heavy Dry Support Bridge
HE	High Explosive
HEAT-MP-T	High Explosive-Multipurpose-Tracer
HEED	Helicopter Emergency Egress Device
HEMTT	Heavy Expanded Mobility Tactical Truck
HET	Heavy Equipment Transporter
HETS	Heavy Equipment Transporter System
HF	High Frequency
HGSS	Hellfire Ground Support System
HGST	Helicopter Gunnery Skills Test
HHV	Heavy High Mobility Multipurpose Wheeled Vehicle
HICAP	Hi-Capacity Ammunition
HIMAD	High/Medium Altitude Air Defense
HIMARS	High Mobility Artillery Rocket System
HIRSS	Hover IR Suppressor System
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HMT	High Mobility Trailer
HQDA	Headquarters, Department Of The Army
HTI	Horizontal Technology Integration
HUD	Heads-up Display
HUMINT	Human Intelligence
HV	Hunter Vehicle
IAW	In Accordance With
IBA	Integrated Battlefield Architecture
ICAM	Improved Chemical Agent Monitor
ICASE	Integrated Computer-Aided Software Engineering
ICBM	Intercontinental Ballistic Missile
ICBT	Improved Common Bridge Transporter
ICC	Information and Coordination Central
ICNIA	Integrated Communications, Navigation, and Identification Avionics

ICOFT	Institutional Conduct of Fire Trainer
ID	Identification
IDL	Interoperable Data Link
IDM	Improved Data Modem
IERW	Initial Entry Rotary Wing
IEW	Intelligence and Electronic Warfare
IFCS	Improved Fire Control System
IFF	Identification Friend or Foe
IFSAS	Initial Fire Support Automation System
IHPTET	Integrated High Performance Turbine Engine Technology
ILMS	Improved Launcher Mechanical System
IMA	Information Mission Area
IMBC	Improved Mortar Ballistic Computer
IMC	Instrument Meteorological Conditions
IMF	Intelligent Minefield
IMINT	Imagery Intelligence
IMTS	Improved Moving Target Simulator
IMU	Inertial Measurement Unit
INFOSEC	Information Security
INMARSAT	International Maritime Satellite
INSCOM	Intelligence & Security Command
INU	Inertial Navigation Unit
IOC	Initial Operational Capability
ITAS	Improved Target Acquisition System
IPPS	Initial Preplanned Supply Support System
IPB	Intelligence Preparation of the Battlefield
IPE	Individual Protective Equipment
IPF	Integrated Processing Facility
IPPD	Integrated Product and Process Development
IR	Infrared
IR&D	Independent Research and Development
IR/VIS	Infrared/Visible
IRB	Improved Ribbon Bridge
IRB	Initial Ready Brigade
IRCM	Infrared Countermeasures
IRDSS	Infrared Defeating Smoke System
IRJH	Infrared Jammer Head
IRS&T	Infrared Search and Track
IRV	Improved Recovery Vehicle
ISE	Intermediate Support Equipment
ISM	Installation Support Module
ISR	Individual Soldier Radio
ISYSCON	Integrated System Control
ITAS	Improved Target Acquisition System
ITEM	Interactive Training Event Menu
ITV	In Transit Visibility

ITW/AA	Integrated Tactical Warning and Attack Assessment
IVIS	Intervehicular Information System
IVMMD	Interim Vehicle Mounted Mine Detector
IW/C2W	Information Warfare/Command & Control Warfare
IWSD	Integrated Weapon System Display
JACG	Joint Aeronautical Commanders Group
JCALS	Joint Computer-Aided Acquisition and Logistics Support
JCS	Joint Chiefs of Staffs
JFC	Joint Force Commander
JP	Joint Publication
JPSD	Joint Precision Strike Demonstration
JRTC	Joint Readiness Training Center
JSIMS	Joint Simulations
JSLIST	Joint Service Lightweight Integrated Suit Technology
JSSAP	Joint Service Small Arms Program
JSTARS	Joint Strategic Target Acquisition and Reconnaissance System
JSTARS	Joint Surveillance Target Attack Radar System
JTAGG	Joint Turbine Advanced Gas Generator
JTAGS	Joint Tactical Air to Ground Station
JTF	Joint Task Force
JTIDS	Joint Tactical Information Distribution System
KE	Kinetic Energy
Km	Kilometers
KMR	Kwajalein Missile Range
LAM	Louisiana Maneuvers
LCC	Land Component Commander
LCLO	Low Cost, Low Observable
LCMS	Laser Counter Measure System
LCU	Landing Craft Unit
LCU	Lightweight Computer Unit
LDS	Laser Detecting Set
LDS	Lightweight Decontamination System
LDTOC	Lightweight Digital Tactical Operations Center
LEAP	Lightweight Exo-Atmospheric Projectile
LGH	Launched Grapnel Hook
LLADI	Low Level Air Defense Interface
LLDR	Lightweight Laser Designator Rangefinder
LMS	Lightweight Mortar System
LMTV	Light Medium Tactical Vehicle
LOC	Lines of Communication
LOSAT	Line Of Sight Anti-Tank
LOS-F-H	Line-of-Sight Forward Heavy
LOS-R	Line-of-Sight Rear
LOTS	Logistics Over-The-Shore
LR	Long Range

LRAS3	Long Range Advanced Scout Surveillance System
LRC	Lesser Regional Conflict
LRCS	Low Radar Cross Section
LRIP	Low Rate Initial Production
LRSBDS	Long Range Standoff Biological Detection System
LRU	Line Replaceable Unit
LSCAD	Lightweight Standoff Chemical Agent Detector
LSCD	Laser Standoff Chemical Detector
LSDIS	Light and Special Division Interim Sensor
LTL	Less Than Lethal
LTWT	Lightweight
LUH	Light Utility Helicopter
LVOSS	Light Vehicle Obscuration Screening System
LW	Land Warrior
M&S	Modeling and Simulation
M3T2	Multi-Mission Medium Tactical Transport
MACOM	Major Army Command
MANPADS	Man Portable Air Defense System
MAPEX	Map Exercise
MASTER	Manufacturing and Structures Technology for Efficient Rotorcraft
MBMMR	Multi-Band Multi-Mode Radio
MCPE	Modular Collective Protection Equipment
MCS	Maneuver Control System
MDEP	Management Decision Package
MDI	Modernized Demolition Initiator
MDS	Modular Decon System
MEDEVAC	Medical Evacuation
MELIOS	Mini Eyesight Laser Infrared Observation Set
MES	Mine Effects Simulator
METL	Mission Essential Task List
MFOM	MLRS Family of Munitions
MHE	Material Handling Equipment
MI	Military Intelligence
MICAD	Multipurpose Integrated Chemical Agent Alarm
MIES	Modernized Imagery Exploitation System
MILES	Multiple Integrated Laser Engagement System
MILSPEC	Military Specifications
MILSTAR	Military Strategic Tactical Relay
MILT	Military Intelligence Language Trainer
MIP	Meteorological Improvement Program
MIRV	Multiple Independently Targeted Re-Entry Vehicle
MITT	Mobile Imagery Tactical Terminal
MLC	Military Load Classification
MLRS	Multiple Launch Rocket System
MMC	Materiel Management Cell

MMR	Multi-Mode Radar
MMS	Meteorological Measuring System
MMU	Medium Machinegun Upgrade
MMW	Millimeter Wave
MNS	Mission Need Statement
MNVD	Monocular Night Vision Device
MOADS	Maneuver Oriented Ammunition Distribution System
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MOTS	Mobile Tower System
MOUT	Military Operations in Urban Terrain
MPIM	Multi-Purpose Individual Munition
MPRS	Mission Planning Rehearsal System
MPS	Mission Planning Station
MPT	Maintenance Panel Trainer
MR	Medium Range
MRC	Major Regional Conflict
MRT	Missile Round Trainer
MSAT-Air	Multi-Sensor Aided Targeting-Airborne
MSCS	Multi-Spectral Camouflage System
MSE	Mobile Subscriber Equipment
MSI	Multi-Spectral Imaging
MSTAR	MLRS Smart Tactical Rocket
MTD	Mobility Technology Demonstration
MTI	Moving Target Indicator
MTI	Multi-spectral Thermal Imaging
MTMP	MACOM Telephome Modernization Program
MTP	Mission Training Plan
MTV	Medium Tactical Vehicle
MWS	Modular Weapon System
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NATS	New Aircraft Tool System
NBC	Nuclear, Biological and Chemical
NBCRS	NBC Reconnaissance System (XM93 FOX)
NBCWRS	NBC Warning and Reporting System
NCA	National Command Authority
NCO	Non-Commissioned Officer
NDI	Non-Developmental Item
NDR	National Defense Radar
NDTE	Non-Destructive Test Equipment
NEISO	Non-Materiel Individual Enhancement of SOF Operators
NEO	Non-Combatant Evacuation Operation
NET	New Equipment Training
NG	National Guard

NIES	Non-material Individual Enhancement of SOF Operations
NMD	National Missile Defense
NMS	National Military Strategy
NOE	Nap-of-the-Earth
NORAD	North American Aerospace Defense
NRTC	National Rotorcraft Technology Center
NRT	Near-Real Time
NSTD	Non System Training Devices
NTH	New Training Helicopter (TH-67)
NTR	National Transport Rotorcraft
NUC	Nuclear
NVPS	Night Vision Pilotage System
O&M	Operations and Maintenance
O&O	Organization and Operations
O&S	Operations and Support
OBC	Officer Basic Course
OCONUS	Outside Continental United States
OCSW	Objective Crew-Served Weapon
OCU	Operator Control Unit
ODS	Operation Desert Shield/ Desert Storm
ODS	Operation Desert Shield/ Desert Storm
OICW	Objective Individual Combat Weapon
OMA	Operations & Maintenance, Army
OOTW	Operations Other Than War
OPFOR	Opposition Forces
OPNS	Operations
OPSEC	Operational Security
OPTADS	Operations Technical Data System (Project Manager)
OPTEMPO	Operational Tempo
ORD	Operational Requirements Document
OSA	Operational Support Aircraft
OSCAR	Outside Cable Rehabilitation
OSCR	Operations and Support Cost Reduction
OSD	Office of the Secretary of Defense
P3I	Pre-Planned Product Improvement
PA	Procurement, Army
PAC-2	Patriot Anti-Tactical Missile (ATM) Capability-2
PAC-3	Patriot Advanced Capability-3
PADS	Position and Azimuth Determining System
PAM	Penetration Augmentation Munition
PASGT	Personnel Armored System Ground Troops
PATRIOT	Phased Array Tracking To Intercept Of Target
PC	Personal Computer
PCAS	Persistent Chemical Agent Simulant
PENAIDS	Penetration Aids
PFASC	Patriot Field Army Support Center

PGMM	Precision Guided Mortar Munition
PIP	Product Improvement Program
PK	Probability Of Kill
PLF	Popular Liberation Front
PLGR	Precision Locating GPS Receiver
PLS	Personnel Locator System
PLS	Palletized Loading System
PLV	Payload Launch Vehicle
PM	Program Manager or Project Manager
PNVS	Pilotage Night Vision System
POL	Petroleum, Oil, and Lubricants
POM	Program Objective Memorandum
POMCUS	Prepositioned Overseas Materiel Configured to Unit Set
POS/NAV	Positive Navigation System
POST	Passive Optical Seeker Technology
PPC4I	Power Projection Command, Control, Communications and Computer Infrastructure
PPU	Prime Power Unit
PREPO	Prepositioned
PRIME	Precision Range Integrated Mass
PSS	Projected Smoke System
PSYOPS	Psychological Operations
QRMP	Quick Response Multipurpose Printer
QRP	Quick Response Program
R&D	Research and Development
RADINT	Radar Intelligence
RAH-66	Reconnaissance/Attack Helicopter
RAM	Reliability, Maintainability and Availability
RAMEP	RAM and Enhanced Performance
RC	Reserve Component
RCAS	Reserve Component Automation System
RD&A	Research, Development, and Acquisition
RD&J	Radar Deception and Jamming
RDA	Research, Development & Acquisition
RDEC	Research, Development & Engineering Center
RDMS	Range Data Measurement Subsystem
RDT&E	Research, Development, Test & Evaluation
RETROEUR	Return from Europe
RETS	Remoted Target System
RF	Radio Frequency
RFI	Radio Frequency Interferometer
RFPI	Rapid Force Projection Initiative
RF/SAL	Radio Frequency Semi-Active Laser
RISE	Reliability Improvement Selected Equipment
RL	Readiness Level
RMP	Reprogrammable Microprocessor

RO/RO	Roll On/Roll Off
ROC	Regional Operation Center
ROE	Rules of Engagement
ROW	Rest of the World
ROWPU	Reverse Osmosis Water Purification Unit
RPA	Rotorcraft Pilot's Associate
RPV	Remotely Piloted Vehicle
RRF	Ready Reserve Force
RSTA	Reconnaissance, Surveillance, and Target Acquisition
RTD	Radar Technology Demonstrator
RTOS	Reconfigurable Tactical Operations Simulator
RTS	Radiac Training System
RTS	Regional Training Sites
RV	Re-Entry Vehicle
RVT	Remote Video Terminals
RW	Rotary Wing
S&T	Science and Technology
SADARM	Search and Destroy Armor Munition
SAL	Semi-Active Laser
SAM	Surface to Air Missile
SAPIC	Small Projected Line Charge
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SATP	Space Applications Technology Program
SATS	Standard Army Towing System
SBIR	Space Based Infra-Red
SBIS	Sustaining Base Information Services
SCAMP	Single Channel Anti-jam Manportable
SCPE	Simplified Collective Protection Equipment
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Organization
SEAD	Suppression of Enemy Air Defense
SECM	Shop Equipment-Contact Maintenance
SEMA	Special Electronic Mission Aircraft
SEMT	Signals Intelligence/Electronic Warfare Equipment Maintenance Trainer
SEP	Soldier Enhancement Program
SF	Special Forces
SFC	Soldier Fighter Cover
SGI	Small Group Instruction
SHF	Super-High Frequency
SHORAD	Short Range Air Defense
SHTU	Simplified Handheld Terminal Unit
SICPS	Standardized Integrated Command Post System
SIGINT	Signals Intelligence
SIMNET	Simulations Networking

SINCGARS	Single Channel Ground and Airborne Radio System
SIP	System Improvement Program
SIPE	Soldier Integrated Protective Ensemble
SIRFC	Suite of Integrated Radar Frequency Countermeasures
SKO	Sets, Kits, and Outfits
SLAM	Selectable Lightweight Attack Munition
SLBM	Submarine Launched Ballistic Missile
SLEP	Service Life Extension Program
SMART-T	Secure, Mobile, Anti-jam, Reliable Tactical Terminal
SMB	Standoff Minefield Breacher
SMR	Simulated Missile Round
SMTS	Surveillance and Missile Tracking Satellites
SO	Special Operations
SOA	Special Operations Aviation
SOC	Special Operations Command
SOF	Special Operations Forces
SOFPREP	Special Operations Forces Planning and Rehearsal Procedures
SOFSA	Special Operations Forces Support Activity
SOMTC	Special Operations Medical Training Center
SOST	Special Operations Special Technology
SOTF	Special Operations Task Force
SPACE	Space Command
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
SPOD	Sea Port Of Debarkation
SPOT	System Probing Observation Terrain
SR	Short Range
SR	Special Reconnaissance
SRAW	Short Range Anti-Tank Weapon
SR-UAV	Short Range-Unmanned Aerial Vehicle
SRBM	Short Range Ballistic Missile
SRSBDS	Short Range Standoff Biological Detection System
SS	Solid State
SSA	Service Support Aircraft
SSA	Staff Support Activities
SSDC	Space and Strategic Defense Command
SSES	Suite of Survivability Enhancement Sensors
STA	System Threat Assessment
STAARS	Standard After Action Review System
STAFF	Smart Target Acquisition Fire and Forget
STANAG	Standardization Agreement (NATO)
STAR-T	SHF Tri-band Advanced Range-extension Terminal
STO	Science and Technology Objective
STOW	Synthetic Theater Of War
STP	Soldiers Training Publication
STPT	Stinger Troop Proficiency Trainer

STRATA	Simulator Training Research Advanced Testbed
STT	Small Tactical Terminal
SVLM	Standard Vehicle Mounted Launcher
SWOE	Smart Weapon Operability Enhancement System
T/R	Transmit/Receive
TAA	Total Army Analysis
TAAD	Theater Area Air Defense
TACAWS	Combined Arms Weapons System
TACOM	U.S. Army Tank Automotive Command
TACSATCOM	Tactical Satellite Communications
TACSIM	Tactical Simulation
TADS	Target Acquisition Designation Sight
TADSS	Training Aids, Devices, Simulators and Simulations
TAIS	Tactical Airspace Integration System
TARDEC	U.S. Army Tank Automotive Research, Development, and Engineering Center
TARP	Target Acquisition and Reconnaisance Platoon
TASCS	Training and Audio-Visual Support Centers
TASM	Tactical Air-To-Surface Missile
TAV	Total Asset Visibility
TBM	Theater Ballistic Missile
TD	Technology Demonstration
TDA	Table of Distribution and Allowances
TDAC	Target Data Acquisition and Correlation
TDATD	Total Distribution Advanced Technology Demonstration
TDI	Technology Demonstration Item
TDP	Total Distribution Program
TEISS	The Enhanced Integrated Soldier System
TENCAP	Tactical Exploitation of National Capabilities
TEP	Tactical Electronic Processor
TES	TENCAP Exploitation System
TESS	Tactical Engagement Simulation System
TF/TA	Terrain Following/Terrain Avoidance
TGS	Thermal Gunner's Sight
THAAD	Theater High Altitude Area Defense
TLD	Top Level Demonstration
TM	Technical Manual
TM-V/V	Technical Manual Validation/Verification
TMD	Theater Missile Defense
TOA	Total Obligation Authority
TOC	Tactical Operations Center
TOE	Table of Organizations and Equipment
TPT	Troop Proficiency Trainer
TRADOC	U.S. Army Training and Doctrine Command

TRITAC	Tri-service Tactical Communications
TSAM	Theater Surface-To-Air Missile
TSS	Topographic Support Systems
TSTT	TADS Selected Task Trainer
TSV	Thru-Sight Video
TTCS	Tactical Terminal Control System
TUG-V	Tactical Unmanned Ground Vehicle
TWGSS/PGS	Tank Weapons Gunnery Simulation System and Precision Gunnery System
TWS	Thermal Weapon Sight
TWV	Tactical Wheeled Vehicle(s)
TWVMP	Tactical Wheeled Vehicle Modernization Plan
UAV	Unmanned Aerial Vehicles
UCOFT	Unit Conduct Of Fire Trainer
UCOFT/MCOFT	Unit Conduct of Fire Trainer/Mobile Conduct of Fire Trainer
UH	Utility Helicopter
UHF	Ultra High Frequency
ULCANS	Ultra Lightweight Camouflage Netting System
UMARK	Unit Maintenance Aerial Recovery Kit
UNAFF	Unified Action Armed Forces
UOES	User Operational Evaluation System
USAADASCH	United States Army Air Defense School
USAF	United States Air Force
USAKA	United States Army Kwajalein Atoll
USAR	U.S. Army Reserve
USAREUR	U.S. Army Europe
USASOC	U.S. Army Special Operations Command
USCINCSPACE	United States Commander in Chief of Space Command
USN	United States Navy
USSOCOM	United States Special Operations Command
UV	Ultraviolet
UW	Unconventional Warfare
VHF	Very High Frequency
VIDS	Vehicle Integrated Defense System
VMMD	Vehicle Mounted Mine Detector
VSRTBM	Very Short-Range Theater Ballistic Missile
WAM	Wide Area Munition
WBC	Warrant Officer Basic Course
WCC	Weapons Control Computer
WMD	Weapons of Mass Destruction